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Editor—HENRY E. SIGERIST

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JOHN SHAW BILLINGS MEMORIAL NUMBER

Today, on April 12, 1938 we are celebrating the hundredth anniversary of the birth of a man who truly ranks among the great pioneers of American medicine. John Shaw Billings' life was less spectacular than that of other medical leaders. Secluded for over thirty years in the Surgeon General's Office, he was not in daily contact with young students who would perpetuate his memory. He had not the sense of humor of Osler or the jovial character of Welch. He was an austere nature and few stories are told about him. The young medical generation hardly remembers his name, and few of the thousands of physicians who consult the Index Catalogue of the Surgeon General's Library know that this epochal bibliography was due to his initiative and unceasing labor. Few of the millions of visitors who use the New York Public Library are aware of the vital part that he played in the history of this great institution.

And yet there can be no doubt that American medicine and the cultural life of the country at large have been profoundly influenced by Billings' work. An expert of international reputation in military medicine, hospital construction, vital statistics and public health, in library matters, medical education, medical history and bibliography, he was a great organizer and whatever field he approached was transformed under his hands.

Our Johns Hopkins School of Medicine is particularly indebted to Billings. Not only was our Hospital built after his plans, but the curriculum of our School, which was so daringly new at the time,

reflected to a large extent his ideas. And for thirty years he was connected with our University and Hospital and gave much appreciated lectures on medical education, hygiene and medical history.

This is why the Johns Hopkins Medical Society and the Johns Hopkins Medical History Club, a forum often addressed by Billings, decided to celebrate this memorable day in a joint meeting, that was held in the Hurd Memorial Hall under the chairmanship of Judge Henry D. Harlan, President of the Board of Trustees of the Johns Hopkins Hospital. We were fortunate in having the cooperation of Lieutenant-Colonel Edgar E. Hume, United States Medical Corps, a graduate of our School who for four years continued Billings' work as head of the Army Medical Library, and of Mr. H. M. Lydenberg, under whose direction the New York Public Library developed in an unprecedented way.

In order to have a permanent record of this day we decided to publish the papers read at the meeting as a Memorial Number of the Bulletin of the Institute of the History of Medicine. We added a reprint of Billings' famous pamphlet on Medical Education and a review that Billings wrote in 1878 in the American Journal of the Medical Sciences. And in order to give this Memorial Number a wider circulation we were glad to have it reprinted in the Bulletin of the Johns Hopkins Hospital.

Together with Fielding H. Garrison's classical biography [1] this Memorial Number will recall a great figure of our medical past, a man who laid solid foundations upon which we can build.

HENRY E. SIGERIST.

The Johns Hopkins University.

[1] Fielding H. Garrison, John Shaw Billings: A Memoir. New York and London, G. P. Putnam's Sons, 1915.

Fig. 1

Portrait of John Shaw Billings by Cecelia Beaux
(at the Army Medical Library)

UNIV. OF MICH.

JOHN SHAW BILLINGS AS AN ARMY MEDICAL OFFICER

A Tribute on His Hundredth Birthday, April 12, 1938

LIEUTENANT-COLONEL EDGAR ERSKINE HUME,
Medical Corps, United States Army

John Shaw Billings spent nearly thirty-four of his seventy-five years of life in the active service of the United States Army Medical Corps. He was commissioned a few days after his twenty-fourth birthday, and retired when he was not yet fifty-eight. So these years represent his most active period. His military career may be divided into three parts: his field service during the Civil War, his development of the Army Medical Library, and his other work in Washington.

Part I

Field Service in the Civil War

Commissioned Assistant Surgeon in the Regular Army, 1861

The outbreak of the Civil War found him, aged twenty-three, demonstrator of anatomy at his *alma mater*, the Medical College of Ohio. He was about to enter into a surgical partnership with his former preceptor, but he was not found wanting when the call of duty came. He applied at once for a commission in the Medical Department of the Regular Army. There was a slight delay on account of lack of vacancies but in September, 1861, he was invited to appear before the Examining Board. He passed first in the list of candidates and was appointed First Lieutenant and Assistant Surgeon on April 16, 1862.

He was at once placed in charge of Cliffburne General Hospital in Washington.

"I began service," he wrote subsequently, "with three things that none of the other surgeons had: A set of clinical thermometers like those Dr. Keen talked about, a straight one and one with a

curve; a hypodermic syringe, and a Symes staff for urethral stricturotomy. . . ." (*Trans. Coll. Phys.*, Phila., 1905, 3 ser., XXVII, 115-6.)

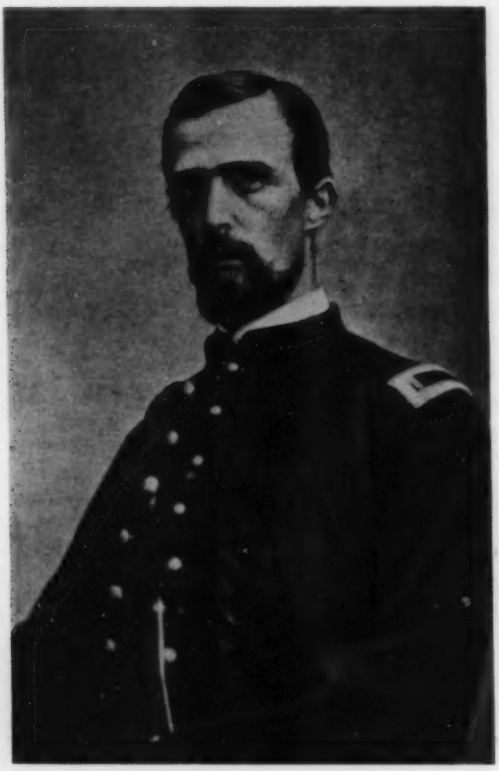

Fig. 2.

John Shaw Billings, aged 25. Photograph as Assistant Surgeon, United States Army during the Civil War (1863).

The hospital was shortly afterwards visited by Surgeon General Hammond, who spoke of Billings's examination, about which the young officer knew nothing except the result. Billings quotes General Hammond thus:

"When you came up for examination they had finished their class, and the report was just ready to go in, when you were sent over with an order to be examined. . . . At the end of the first day they concluded that probably you would pass, but hoped it would not be necessary to change the order of precedence in the roll, and that you would come in at the bottom. The second day they thought they would have to put your name higher up, and on the third day they concluded that you would be at the head of the class, but that, to be fair, they ought to ask you the same questions that they had asked Dr. Adams, who was previously the head of the class, and so they began all over again with you." (*Trans. Coll. Phys. Phila., loc. cit.*) So Billings came out first. He was always preeminent in every Army situation.

Director of Cliffburne Hospital, 1861

Cliffburne Hospital, which had formerly been the barracks of the Fifth United States Cavalry, was found by Billings "in an extremely filthy and delapidated condition—no drainage whatever, no sinks, no water within half a mile." So his first military duty was in the realm of sanitation. His detailed account of how he brought order out of chaos shows that even in those early days he had a genius for hospital construction as well as sanitation.

With a certain dry humor, Billings wrote of one of his many difficulties at Cliffburne. He had a large number of Confederate as well as Union wounded. "The old residents of Georgetown and Washington were mostly in sympathy with the Confederates, and came out bringing good things to eat and drink with the desire that these things should be for the exclusive use of the Confederates. On the other hand, the ladies and families of the members of Congress and of officers in the departments were enthusiastic for the Northern side, and they also came with good things, but with the specification that none should go to the rebels. We would not receive gifts from either party on these terms, but after a little explanation they were left to be used for those who needed them most." (*Trans. Coll. Phys.*, Phila., 1905, 3 ser., XXVII, 117.)

At Cliffburne Hospital Billings did nearly all the surgery. Here

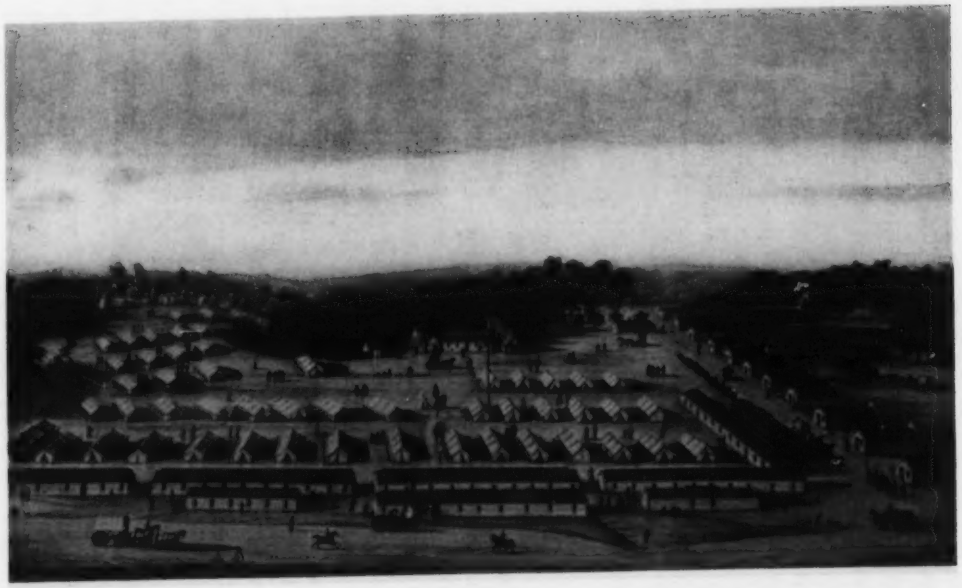

Fig. 3.

Cliffburne Hospital, Washington, D. C.—1862.

he did the first exsection of the ankle-joint—and a perfect recovery took place.

At Satterlee General Hospital, 1862

In the autumn (1862) he was sent to Philadelphia where he remained as Executive Officer of the Satterlee General Hospital until the following spring. Before he left, a document was drawn up by the hospital staff begging him "to accept from us a saddle and bridle and full horse equipments, which we hope will be of service to him in the field, and will serve to remind him of the friendly feelings of his former associates."

With the Army of the Potomac, 1863

On March 20, 1863 Billings was ordered to report for field duty to the Medical Director of the Army of the Potomac. This was Surgeon Jonathan Letterman, whom we of the Army Medical Corps consider one of our most brilliant officers. He reorganized the medical department of the Army of the Potomac, including its ambulance and supply services. Our military hospital in San Francisco, second only to the one in Washington in size, bears his name.

The Army of the Potomac, commanded by General Hooker, was then lying on the left bank of the Rappahannock River in Stafford County, Virginia, in wide-spread camps which it had occupied since the disastrous battle of Fredericksburg in the preceding December. Assistant Surgeon Billings was immediately assigned to the Eleventh United States Infantry. Joe Hooker was preparing to cross the Rappahannock in order to attack Lee. The battle of Chancellorsville followed.

The Battle of Chancellorsville

"My experience in Chancellorsville," Billings wrote long afterwards, "was that of handling wounded without an ambulance corps, and getting them off when the troops were falling back. It is one thing to provide for wounded when the troops are advancing and leaving the hospital behind, and quite another thing to fall back with your wounded when the troops are retreating." (*Trans. Coll. Phys.*, Phila., 1905, 118.)

In May he was put in charge of the Division Field Hospital. He

wrote his wife on May 8th: " You will have read of course that we retreated—the Eleventh Corps, formerly Sigel's, was entirely routed and skedaddled in a most disgraceful manner, and has not rallied yet. We lost altogether between ten and fifteen thousand men, and our cavalry is still in danger, being not yet across the river. . . . I will not conceal from you that I feel disgusted and that I am utterly hopeless as far as regards taking Richmond or beating Lee with our present troops and generals. No one here expects to do it. If a battle were expected to-morrow, we should calculate on a retreat as a matter of course. I suppose we shall have a new General-in-Chief here before long but that will not make it any better in my opinion. The Rebs are better and braver soldiers than the men of this Army, and are under far better discipline. . . . They are afraid to allow any New York papers to come down to the Army, so that I am entirely in the dark as regards news but I suppose Hooker is condemned all round." (Garrison, pp. 44-45.)

On May 15, 1863 Dr. Billings was assigned to the 7th and 10th Infantry Regiments. Word came that General Lee's Army had begun its northward movements towards Maryland and Pennsylvania. General Meade replaced General Hooker and the Army of the Potomac moved on.

A passage from a letter (June 18th) to his wife gives a picture of his life in the field:

" I shall describe the order of a day's march for you. Reveille sounds at three in the morning—up we all get and I take a good wash and fill my pipe and smoke peacefully. By the time that is done, Nell brings me a tin cup of coffee, two hard crackers and a piece of fried ham. Then I fill another pipe and have the steward call up the sick of both Regiments and I prescribe for them—giving passes for the ambulance to those whom I deem unable to march. By the time this is done Nell and Shorty have struck my tent, packed up my things and saddled Dick, who has been all this time eating his breakfast. Then the assembly sounds and I stroll round smoking and sympathizing with the miseries of my fellow sinners. About 1 P. M. we halt near some creek, I unsaddle Dick and let him go into the grass, my cook gets a cup of coffee and a hard cracker, and I smoke a pipe. About 6 P. M. we halt for the night,

when the performance is the same, washing, eating, smoking, lounging on the grass, and sleeping. Then we are kept in an agreeable state of chronic excitement by all sorts of terrible rumors which, with the officers' comments thereon, are as good as a newspaper and just as reliable. After we have toddled around a week or two, we shall go into camp again and then there will be a big mail, something to eat, and a good bed." (Garrison, pp. 55-56.)

All this marching brought the Army of the Potomac nearer and nearer to the Army of Northern Virginia, and the decisive battle of the war was at hand. Billings's great physical strength was to be needed in his sleepless days and nights at Gettysburg.

The Battle of Gettysburg

" For the approaching battle, I was detailed as surgeon in charge of the field hospital of the [Second] Division, and, also, as one of the operators. . . . About half-past three [July 1st, 1863] the Division was brought into action, marching down a little road to the right of the large conical hill called Round Top, which was on the extreme left of the long arm of our horse-shoe like line of battle. I accompanied my regiment until they came under fire, and was then ordered to repair to a large stone house and barn, near the base of Round Top, and there establish a field hospital. . . . I performed a large number of operations of various kinds, received and fed seven hundred and fifty wounded, and worked all that night without cessation. . . . All of [July 3rd] I was employed in operating and in dressing the more urgent cases. The following morning it began to rain, and continued to do so for five days and nights with very little cessation. On the morning of the 5th, the regimental medical supply wagons came up, and from them I removed all the hospital tents. . . . On this day the Division moved. I was left behind in charge of the hospital, which then contained about eight hundred wounded. Twenty men were detailed from the Division to act as assistants about the hospital. . . . The greatest want I experienced was that of tools. I had not a shovel or pick with which to bury the dead or construct sinks, and no axes."

" Very few shell wounds came under my notice at this battle, and

none from round balls or buckshot. Most of the wounds were from the conoidal ball, and a large proportion were in the lower extremities. . . . No cases of tetanus occurred in this hospital. Of secondary haemorrhage there were thirteen cases up to the 22nd of July, at which time I left the hospital." (He continues with detailed account of the types of wounds and operative procedures.)

To his wife he wrote on July 6th from the Hospital near White Church, Pennsylvania: "I am utterly exhausted mentally and physically, have been operating night and day and am still hard at work. . . . Our Division lost terribly—over 30 per cent. were killed and wounded."

He wrote her again on July 9th from the Hospital near Gettysburg: "The days creep by and I am still trying to produce order out of chaos, and to get my wounded patriots into something like a state of comfort. . . . I am covered with blood and am tired out almost completely, and can only say that I wish I was with you to-night and could lie down and sleep for 16 hours without stopping."

Billings's health was so shattered with all this continuous duty that he was obliged to apply for thirty days sick leave. He left the Fifth Corps Field Hospital on July 22, 1863, and rejoined his command in August.

The New York City Draft Riots, 1863

The serious Draft Riots in New York City in July 1863 made it necessary for the War Department to send several veteran regiments to quell the disturbance. Billings accompanied the Seventh Infantry. In New York he was assigned to the McDougall General Hospital at Fort Schuyler, New York Harbor. Here there was comparatively little for him to do and the sudden change from his hard service in the field was an unpleasant change. He wrote in his diary on September 25th: "I am going to ask Dr. McDougall [Medical Director of the Department of the East] to give me a place where I can have something to do in a professional way, such as taking charge of a ward in the Hospital or something of that kind. . . . I suppose I might as well get used to the monotony and idleness of post life, for when this cruel war is over it will become my usual mode of existence. . . . The great weapon I have always wielded

against this ennui has been reading and study, but that seems to have lost its efficiency."

He remained on duty at various hospitals in and near New York City until February 1864, where doubtless the inaction as above described, continued irksome to his active nature.

Confidential Mission to Haiti, 1864

In February and March, 1864, Dr. Billings was in charge of an unusual enterprise and one sufficiently active to hold his interest. He was sent, under sealed orders, to bring back to the United States the unfortunate negroes who had been taken to the *Ile à Vache*, belonging to the Republic of Haiti, for an attempt at colonization. An adventurer named Bernard Kock had made a contract with President Lincoln to colonize 5000 negroes on this island at $50 per head, but the scheme fell through and such of the negroes who were left alive after epidemics of small-pox and other diseases, were to be brought back. "As often happened," says Garrison, "an honest man of strong character had to be found to patch up the mischief-making of a sharp practitioner." (Billings—*Memoir*, p. 73.)

Final Service in the Field, 1864

At the end of March, Assistant Surgeon Billings was ordered back to the Army of the Potomac. The final campaign of the War was beginning. Though not holding that title, Billings served as a medical inspector of the Army of the Potomac, his duties being as exacting as varied. "Constantly on horseback, keeping a strict eye on things everywhere, it was his duty to collect medical statistics, look after the disposition of ambulances and supplies in connection with the transportation and care of the wounded, write telegrams and assist in framing orders, supervise the collection of pathological specimens, send wounded and infectious cases from the field to hospitals with all dispatch, and sometimes even to operate in difficult cases. Here he undoubtedly developed his remarkable talent for organization and administration. His skill in improvising messages of unmistakable clearness and precision won for him the praise of his ranking officers and fixed the future ideal of a literary style

which should be, as he long afterwards expressed it, 'concise as a telegram.'" (Garrison, 75.)

General Grant followed the well-known dictum of his former commander, General Winfield Scott, who said, "I am in the habit, when on duty with troops, of paying great deference, and even of yielding my opinion, on matters deeply affecting health and life, to the advice of my medical staff." Grant, too, held his medical officers in esteem. Billings was introduced to the General on April 16, 1864. As usual, Billings's first impressions were acute: "I *like* Grant. He is a thoroughbred gentleman and suits me exactly." (Billings—*Memoir*, p. 75.)

On May 9th, during the battle of the Wilderness, Billings recorded: "General Sedgwick just brought in from the front—died five minutes after getting here, shot through the base of the brain by a sharpshooter. . . . I sent one spring wagon with ice with which to preserve, if possible, General Sedgwick's body which now lies here. . . ." Major-General John Sedgwick, one of the most gallant officers of the old army, was greatly admired by Dr. Billings who named his son for him. One week later he wrote his wife: "I enclose with this letter a bunch of violets which I picked close to where Gen'l. Sedgwick was killed."

After General Ewell's attack on Tyler's Division, we find this entry in Billings' notebook:

"May 20th—A very scurrilous and utterly false article appeared in yesterday's *Chronicle*—that the wounded in Fredericksburg were entirely destitute of supplies, even food; also that the negroes fought desperately. All this is false. The negroes have not yet fought, except in a slight skirmish with Rosser's cavalry. 656 wounded received last night at the 2nd Corps Hospital. A very large number of these were wounded by their comrades (probably self-mutilation for malingering purposes), the wounds being blackened with powder and mostly in the fingers and arms."

On May 29th he wrote Mrs. Billings: "I believe all will prove for the best for us in the end and that both you and I in years to come will be glad that I was in this campaign."

And so on through the campaign. Lack of space forbids yielding

to the temptation to make more or longer quotations from Billings's letters and note-book entries. From them one can picture this alert, enthusiastic and gifted man in the field, beset by dangers and fatigues but never losing his courage. It was necessary for him to have another sick leave in late July, 1864 and before this time had expired he was ordered to report to the Medical Director of the Army of the Potomac in Washington for duty in his office. So his field service came to an end.

Critical Review of the Campaign

Forty years later Billings thus summed up his criticisms of the medical work that he had seen during the campaign:

"Looking back at the war as I remember it, it is a wonder that so many of the medical officers did as well as they did, and that the results were as good as they were. My main criticism of the surgical work that I saw was too much resection was attempted in cases of injury of the long bones. If a ball smashed a femur some surgeons wanted to get out all of the fragments, although in doing so they made the injury much more severe." (*Trans. Coll. Phys.*, Phila., 1905, 3 ser., XXVII, p. 121.)

Billings's description of the battle of the Wilderness, as rewritten from his note-books and published in the Report of the Medical Director of the Army of the Potomac shows what manner of military observer he was:

"As has been well said, 'this was a battle which no man saw or could see,' fought in the midst of dense thickets of second growth underbrush and evergreens, rendering the use of artillery almost impossible, and compelling the opposing lines to approach very near in order to see each other. It was a series of fierce attacks and repulses on either side, and the hostile lines swayed back and forth over a strip of ground two hundred yards to a mile in width, in which the severely wounded of both sides were scattered. This strip of woods was on fire in many places, and some of the wounded who were unable to escape were thus either suffocated or burned to death. The number who thus perished is unknown, but it is supposed to have been about two hundred. The stretcher-bearers of the

ambulance corps followed the line of battle closely, and displayed great gallantry in their efforts to bring off the wounded lying between the lines, but with very little success, it being almost impossible to find wounded men lying scattered through the dense thickets, and the enemy firing at every moving light or even at the slightest noise. . . . The proportion of officers wounded was very large, being one to every sixteen enlisted men. This was due to the fact that the conflict partook of the character of skirmishing on a large scale, and those who were the most conspicuously dressed were the first victims. For a similar reason the Zouave Brigade of the 1st Division, Fifth Corps, whose uniforms were braided with red and yellow scrolls met with a very heavy loss. . . . As an interesting fact bearing upon the character of the conflict, it may be mentioned that it is stated by the chief ordnance officer that but eleven rounds of ammunition per man were used by the Army during the three days' fight." (*Med. and Surg. Hist. of the War*, Wash., 1870, Pt. I, Vol. I, pp. 151-152.)

This passage is but one of many interesting bits of Billings's writing in the *Medical and Surgical History of the War of the Rebellion* (unfortunate name). There are case reports which show Billings to have been one of the most skillful operators of his day. His major surgery was wide in scope, even in those pre-antiseptic days. He was the first surgeon in the war to attempt the unusual operation of excision of the ankle joint (on January 6, 1862), which had been done only twice or thrice before in the whole history of surgery; and Billings's case was successful. Garrison calls attention to this priority, for Lister's classical paper on excision of the wrist, which set the pace in such procedures, was not published until 1865.

Dr. S. Weir Mitchell, whose own services in the War were outstanding, and who in collaboration with Dr. William W. Keen, wrote a monograph on gunshot wounds of nerves, gives us this picture of Billings as a young military surgeon:

"To comprehend the character of a man, he must have been seen in relation to the various duties which test the qualities of both heart and head. The charge of suffering, crippled, wounded soldiers is a trial to the surgeon, and here he showed the man at his best. He was patient with the impatient, never irritable with the unreason

of sufferers, never seeming to be in a hurry, and left at every bedside in the long sad wards the impression of being in earnest and honestly interested.

"It was thus I first knew John Billings when in the crowded wards wearied homesick men welcomed his kindly face and the almost womanly tenderness he brought to a difficult service.

"My own personal relations with John Billings began in the Civil War when he had for a time the care of my brother, a medical cadet, during a mortal illness contracted in the Douglas Hospital, Washington. I saw then how gentle-minded was this man and how he realized the pathetic disappointment of the highly gifted young life consciously drifting deathward. I saw thus a side of John Billings he rarely revealed in its fullness." (*Science*, N. Y., 1913, n. s., XXXVIII, 831.)

On March 13, 1865 Billings received the brevets of Captain, Major and Lieutenant-Colonel "for faithful and meritorious services during the war."

Part II

Service in Washington

Billings would have been a famous medical officer and man of science even had he never served in the field, or if he had not fathered the Army Medical Library. His was a nature of many sides and he turned his attention with success to an extraordinary number of interests.

The Medical and Surgical History of the War

On August 22, 1864 he was relieved from duty in the field and assigned to the Washington branch of the Office of the Medical Director of the Army of the Potomac. Here his work was the arrangement and analysis of the field reports out of which grew the monumental *Medical and Surgical History of the War*, those seven elephantine tomes still standard works of reference. In December of the same year he was transferred to the Surgeon General's Office in the War Department. Here for some ten years he was

TOP ROW STANDING *Left to Right*

WILLIAM CANFIELD SPENCER
Major Surgeon and Brevet Lt. Col., U. S. A.

ALFRED ALEXANDER WOODHULL
Assistant Surgeon, U. S. A.

JOSEPH K. BARNES
Brig.-Gen'l. and Surgeon General

EDWARD CURTIS
Assistant Surgeon and Brevet Major, U. S. A.

BOTTOM ROW SEATED

GEORGE OTIS
Assistant Surgeon, and Brevet Lt. Col., U. S. A.

CHARLES HENRY CRANE
Col. and Assistant Surgeon General, Brevet Brig. Gen'l., U. S. A.

JOHN SHAW BILLINGS
Assistant Surgeon and Brevet Lt. Col., U. S. A.

JOSEPH JANVIER WOODWARD
Assistant Surgeon and Brevet Lt. Col., U. S. A.

FIG. 4.

Surgeon General Joseph K. Barnes and his Staff, about 1866. We see Billings here as he appeared when he undertook the direction of the Army Medical Library. Brevet Major Edward Curtis was his collaborator in the work on the minute fungi. Brevet Brigadier General Charles Henry Crane became Surgeon General in 1882 and Billings served under him until the General's death in 1883.

officially "in charge of the Veteran Reserve Corps organization, of matters pertaining to contract physicians, and to all property and disbursing accounts." Not a very inspiring assignment, but to even this routine he devoted his great energies, though Assistant Surgeon General Woodhull defined it as "arid drudgery among invoices and receipts, requisitions and bills of lading, treasury drafts, and auditor's decisions." Until 1875 he did this work—but in his spare hours he found time to do other things as well. He devoted himself to the study of microscopy and photomicrography as well as comparative anatomy, and taught himself the reading of scientific German by laboriously digging through Virchow's monograph on tumors, in the original. So accomplished did he become in microscopy that had he pursued it as an end in itself he would have become an authority on the subject in time (Garrison). His studies on the minute fungi led to the publication of the report, made with Major Surgeon Edward Curtis, on cryptogamic growths in cattle diseases and his subsequent work in the Laboratory of Hygiene at the University of Pennsylvania when he accepted the chair there.

"In Far Eastern lore," says Garrison, "he was probably more deeply versed than any other American physician of his time." His unusual gifts of vision and memory made it possible for him to absorb a vast amount of information with great rapidity. For a time he kept a private journal. In reading the entries therein, one is struck on every page with the multiplicity of his interests and the extent to which he carried out his concept.

Survey of the United States Marine Hospital Service

In 1869 his activities became extended in an entirely new direction. This was his study of the Marine Hospital Service, in which he was engaged more or less continuously for the next five years. Those who know the splendid United States Public Health Service of to-day may have difficulty in understanding the bad way into which the old Marine Hospital Service, its forerunner, had fallen just after the Civil War. Two of the principal duties of that service then, as now, were the care of sailors of the merchant marine in seaports and in inland waters, and the quarantine at ports of entry. While the permanent officers of the Marine Hospital Service were

efficient, there were many local representatives, often poorly qualified physicians, appointed through political influence, who were inefficient. A policy of false economy in some instances led to a sort of sub-letting the care of the sick and disabled seamen to local hospitals. The Secretary of the Treasury, who has always been responsible for this service, asked that Dr. Billings be loaned from the Army for the purpose of making a comprehensive study of the situation, so that he might make recommendations for correction of the defects. Billings had already established a reputation as a capable administrator with wide vision, and as "Consulting Surgeon," as he was called, in the Marine Hospital Service, he was able to do an outstanding piece of work. He inspected the Marine Hospitals in almost all the ports in the country and made his wise recommendations. In his annual report, the Secretary of the Treasury said:

"The condition of the marine hospitals has been improved during the past year. The result is largely due to Dr. J. S. Billings, of the Surgeon General's Office, who has visited nearly all of them, and through whose advice many important changes have been made." (*Rept. Sec. Treasury*, Wash., 1870, p. xii.)

Billings continued this duty until 1874 and is given credit for taking the Marine Hospital Service out of politics and giving it Army methods of organization and discipline which it still has. Assistant Surgeon General Woodhull said: "He prepared a comprehensive and well-ordered plan for organization under a merit system and a scheme for proper and independent hospitals and their management, all with responsibility to competent central authority." (A. A. Woodhull, *Journ. Mil. Serv. Inst.*, Governor's Island, N. Y., 1913, LIII, 333.)

Survey of United States Army Barracks and Hospitals

While engaged in his study of the Marine Hospitals, Billings made two important contributions to military sanitation. They were his reports to the Surgeon General on barracks and hospitals, and on hygiene in the Army. The full titles of these "Circulars" as such publications used to be called, are:

A Report on Barracks and Hospitals; with Descriptions of Mili-

tary Posts. United States War Department, Surgeon General's Office Circular No. 4, Washington, 1870, pp. xxxii, 494.

A Report on the Hygiene of the United States Army; with Descriptions of Military Posts. United States War Department, Surgeon General's Office Circular No. 8, Washington, 1875, pp. lix, 567.

These two publications are still in use for historical and practical reference. He showed that our military service had "the best fed and the worst housed army in the world," as he put it (Circular No. 4, p. xxxii). The best parts of these voluminous documents are Billings's comments and recommendations. He gave effective criticism of the deficiencies in bathing facilities, sleeping accommodations, latrines, the poor state of guard-houses, and discusses at length the ventilation and heating. It has been well said that his study of the hospitals of the Army was the beginning of his interest in the subject and his future extensive work which resulted in the plans for the Johns Hopkins and Peter Bent Brigham Hospitals.

The following shrewd observations and comments give an idea of the whole reports:

"It is manifestly impracticable to plan a hospital which shall be equally suited to the burning mesas of Arizona and to the bleak North Atlantic coast. Nor can it be expected that the hospitals of a temporary post, often little more than a camp, shall be equal in structure and comfort to those of a permanent post. But even a log or mud hut need not be built in absolute and direct defiance of all sanitary laws, and especially to be depreciated is the turning over of old barracks or officers' quarters to hospital use." (Circular No. 4, p. xxii.)

"The ultimate cause of the defects is, of course, ignorance, the immediate cause being a desire for economy, praiseworthy in itself, but producing results which are the reverse of its object; for a saving in boards and brick, at the expense of the health and life of the soldier, cannot be considered a commendable thrift. It is clearly both the interest and duty of the Government to reduce, as much as possible, the annual loss to the Army resulting from sickness, in-

valididing, desertion and death; and this can only be effected by a judicious application of the laws of sanitary science." (Circular No. 4, p. xxxii.)

Billings insisted that "Every man should have his sixty feet of floor space as much as his ration." This dictum was disregarded at times in the construction of the temporary barracks during our mobilization for the World War, and during the pandemic of influenza we paid a price for such lapse of memory.

In 1880 the American Public Health Association elected Billings President and, as his first contribution to its work, he recommended a systematic sanitary survey of the United States. "It would establish the foundations of a national public hygiene in this country," he wrote. "Until some such sanitary survey is accomplished, state medicine in this country cannot take rank as a science, but must rest mainly upon individual opinions and hypotheses, as it does now." (*Am. Pub. Health Assn. Papers and Rpts., 1874-5*, N. Y., 1876, II, 44.)

Here we have an echo of *The Principal Diseases of the Interior Valley of North America* (1850), by that stout old medical pioneer, Daniel Drake, whose influence, particularly in his city of Cincinnati, Billings must have felt while a student there. Drake's name, said Billings, "should be among the first on the list of the illustrious dead of the Medical Profession of the United States." Billings suggested the use of an elaborate *questionnaire*—he always used *questionnaires* with effect—to be submitted to all towns of over 5000 population. When it was found that the difficulties of obtaining the needed data and the expense were so great, the project was abandoned.

Vice-President of the National Board of Health

In 1879 Congress created the short-lived National Board of Health, governed by a board consisting of a medical officer each of the Army, Navy, Marine Hospital Service and seven other members, to be appointed by the President. Dr. James L. Cabell of the University of Virginia was appointed President, and Billings Vice-President. The recent epidemic of yellow fever had given an impetus to the often discussed national health organization, but the

law was rushed through Congress against the strong opposition of the Marine Hospital Service. The duties of the Board were to collate information on all matters relating to public health and to advise with State and other health departments. It was also charged, in cooperation with the National Academy of Sciences, with the elaboration of a scheme for national sanitary organization, particularly the Quarantine. The Board accomplished several important things, including the adoption of a scientific nomenclature of disease; a study of disinfectants; an investigation of yellow fever in which such men as Surgeon General Sternberg and Guiteras of Cuba were actively interested; consideration of adulterations of food and drugs; an investigation of organic matter in the air, a piece of research directed by Professor Ira Remsen of Johns Hopkins; a study of diseases of food-producing animals; and sanitary surveys of New York Harbor and Memphis, Tennessee, Dr. Billings being in charge of this work.

The Board met opposition from local authorities and certain business men and politicians. Billings gave a comprehensive report of the Board's activities to the Public Health Section of the American Medical Association in 1880, and said that the creation of the Board was premature, being the outgrowth of the yellow fever scare. "As soon as the emergency had passed," he wrote, "the Board would find itself without the support of an educated public opinion, and upon such an opinion alone, under our form of government, can such an organization securely rest." As usual, Billings's observation went to the very heart of the difficulty. The work of the Board dwindled year by year as appropriations were not forthcoming. Billings resigned the Vice-Presidency in 1882 and by 1886 the Board was no more.

Review of A Century of American Medicine, 1876

In the Centennial year of the United States, 1876, there was published *A Century of American Medicine*, by Edward H. Clarke (Harvard), Henry J. Bigelow (Harvard), Samuel D. Gross (Jefferson), T. Gaillard Thomas (Physicians and Surgeons, New York), and John S. Billings. Of this monograph, seventy-five pages were devoted to Billings's consideration of the Literature and

Institutions of the country. He gave an exhaustive historical and statistical account of the medical periodicals, societies, libraries, museums and medical schools of the United States. Again Billings's keen analytical mind grasped and set forth the actual conditions of American medicine in the Centennial year.

He divided American Physicians into three general classes. First, "a very few men who love science for its own sake, whose chief pleasure is in original investigations, and to whom the practice of their profession is mainly, or only, of interest as furnishing material for observation and comparison. Such men are to be found for the most part only in large cities where libraries, hospitals and laboratories are available for their needs. . . . Of the highest grade of this class we have thus far produced no specimens; the John Hunter, or Virchow, of the United States, has not yet given any sign of existence." Secondly, he cited the much larger class of physicians who practice their profession to obtain money or social position. "They are clear-headed, shrewd, practical men, well educated, because 'it pays,' and for the same reason they take good care to be supplied with the best instruments, and the latest literature. Many of them take up specialties because the work is easier, and the hours of labor more under control. . . ." The third class includes those men whose education is defective but who are nevertheless often successful. "They are honest, conscientious, hard-working men, who are inclined to place great weight on their experience, and to be rather contemptuous of what they call 'book learning and theories'" (pp. 363 *et seq.*).

Referring to medical education he says: "Certainly the standard for admission and for graduation at almost all our medical schools is too low, and one-half, at least, of these schools have no sufficient reason for existence; but it is not probable that it would improve matters much to establish a uniform, which must, of course, be a minimum, standard" (p. 366).

Essay on Yellow Fever

Billings's extensive experiences with yellow fever are set forth in a delightful paper, perhaps the most important essay on the subject of that day. "The belief," he said, "that disease ever spontaneously

originates from combinations of filth, heat, moisture, and the presence of unprotected persons, is an exercise of pure faith with which science has nothing to do at present, as there is no evidence in its favor, and certainly, if this combination could produce it, we should long ago have heard of its appearance in tropical ports of Asia, or in ships visiting the inter-tropical Pacific, whereas it has never occurred at these points. Sanitary shriekings about filth have had and still have their utility in calling public attention to the evils of uncleanliness of air, food, drink or persons, but they soon lose their power when used by amateur hygienists as their sole stock in trade. . . ." (*Internat. Rev.*, N. Y., 1880, VIII, 29-49.)

On Medico-Military Preparedness

Our present military policy is based on the concept that the Regular Army exists for the purpose of training a great army of citizen-soldiers, who would be called into service in the event of an emergency. This idea, though considered comparatively new, was grasped by Billings as early as 1870, for in his "Circular No. 4" (see above) he said:

"The whole system of military organization is an education and a preparation for emergencies and circumstances which may never occur. And as troops are drilled in the use of arms, though no enemy be present, so should they be familiar with the system which is necessary on the part of the Medical Department in time of war or epidemics. And to refuse to furnish the necessary accommodations and facilities to medical officers is very much like refusing to allow soldiers to use muskets, cannon, or horses in time of peace.

"Our military system is, or should be, organized on the theory that it is to act as a nucleus and organizing power for the force to be called into existence in time of war. When a war breaks out we must have large hospitals; if these are to be efficient they must be thoroughly organized. The knowledge of this organization is best obtained by practising it previously on a small scale." (Circular No. 4, p. xxiii.)

The Vital and Medical Statistics of the Census

Though Billings knew nothing of the vital statistical work of Karl Pearson and his followers, he was well versed in the mathematical methods of Körösi, Rumsey, Farr and others of an earlier day. From 1878 until his death he took a keen interest in the national censuses of the United States. The first of his accurate and extensive reports on vital and medical statistics of the country was in connection with the Census of 1880. They were continued in connection with the census-taking of 1890, 1900 and 1910. He employed the usual methods of interpretation, applying statistical induction from the figures furnished him to establish new data as to racial equation and racial incidence in disease. Some of his conclusions have been extensively quoted.

He suggested in 1889 that the various statistical data "might be recorded on a single card or slip by punching small holes in it, and that these cards might then be sorted and counted by mechanical means according to any selected group of these perforations" (*Proc. Am. Assoc. Adv. Sc.*, 1891, XL, 407-9). The electric counting and integrating machines now used in the Bureau of the Census of the United States, and elsewhere in repositories of vital and other statistics, are the result of this suggestion. Another of Billings's favorite devices was the use of maps on which circles, with sectors variously colored, represented the mortality of different races and communities, or racial incidence in disease. He exhibited such maps and charts before the National Academy of Sciences on November 18, 1891, of which body he was for many years Treasurer.

In 1889 he delivered the Cartwright Lectures before the College of Physicians of New York on *Vital and Medical Statistics* (*Med. Rec.*, N. Y., 1889, XXXVI, 589, 617, 645). The publication of these lectures attracted wide attention. The conclusion reflects Billings's understanding of the subject and realization of the inadequacies of the older methods of study:

"In vital statistics, as in other branches of social science, it is not true that the effects of causes acting in combination are equal to the sum of the effects of each of the causes acting separately. Different causes of death having no relation to each other do not

Fig. 5.

John Shaw Billings, aged 50.

have a joint effect which is equal to the sum of the effects of each cause taken separately, and it is therefore difficult to bring the phenomena of vital statistics within the boundaries of mathematical formulae. In the doctrine of this kind of averages, time and number are not convertible terms.

" Statistics apply to masses of men, to communities—not to individuals. We find a mass of matter moving in a certain direction with a certain velocity, and endeavor to calculate the direction and amount of the forces which have produced this result. In like manner we may consider the tendency to death in a community as a resultant of several forces as indicated in the diagram, and endeavour to estimate the influence of each of these forces on producing the result.

" It is evident that we can know little of the influence which hygiene or therapeutics have had in shortening the line A-B, if we know nothing of the length and direction of the other lines of force, and hence we must have the conclusions of vital statistics to make proper use of medical statistics.

" In studying medical and vital statistics one is somewhat in the position of a man on the deck of a large Atlantic steamer out of sight of land and gazing on the troubled ocean. He sees many waves, large and small, apparently moving in every direction; and it is not until he has, by careful examination and repeated comparison, learned to distinguish the ripples due to the wind now blowing, the larger cross seas resulting from forces which were acting a few hours before, and the long, rolling swells which indicate to some extent the direction and force of the tempest of yesterday, that he can begin to understand the roll of the ship on which he stands; while to appreciate the force and direction of the great current which is sweeping with it all the troubled water and the ship itself, requires skilled observation with special instruments, and the use of charts which embody the experiences of hundreds of voyages. So also in viewing the records of human life, disease and death, the variations which are at first more perceptible are often those which are most superficial, and which give little or no indication of the magnitude and direction of the movement of the great masses beneath " (pp. 655-6).

Said Dr. Welch, at the memorial meeting in honor of Billings shortly after his death: "He was the greatest vital statistician this country has produced" (*Johns Hopkins Hosp. Bull.*, 1914, XXV, 252).

Curator of the Army Medical Museum

Billings is so well known as the Librarian of the Army Medical Library that his direction of the sister institution, the Army Medical Museum, is sometimes overlooked. His interest in the medical museum began at the very first inception of the institution by Surgeon General Hammond in 1862. In Billings's diary on his Civil War service we find this entry:

"April 30 [1864]. Dr. Brinton [Surgeon of Volunteers, who became the first Curator of the Army Medical Museum] sent me a barrel of whisky yesterday with which to preserve surgical specimens, and immediately after the next battle, I expect to send enough pickled arms and legs to the Surgeon General to make a museum of themselves." As the battle of the Wilderness followed on May 5th and 6th, Billings had his opportunity to fulfill this promise.

The Army Medical Museum has grown steadily until it is today the largest institution of its kind in America, and one of the greatest in the world. On December 28, 1883, Surgeon General Robert Murray consolidated the Museum and Library, forming the "Museum and Library Division of the Surgeon General's Office," with Dr. Billings in charge. Billings took hold of his new task with his usual vigor and enthusiasm. He outlined a *Guide Book for the Army Medical Museum and Library*, which unfortunately was never published (D. S. Lamb, *Hist. of U. S. Army Med. Museum*, 1917, p. 85). He did, however, from time to time, publish papers on the work of the Museum and the place that it should occupy in the medical profession. The most important of his writings on this subject was his Presidential address before the Congress of American Physicians and Surgeons, Washington, 1888, *On Medical Museums* (*Med. News*, Phila., 1888, LIII, 309-316). He outlined the development of medical museums throughout the world, bespeaking for the National Medical Museum, as he called it, "the intelligent interest and friendship of the medical profession of the country."

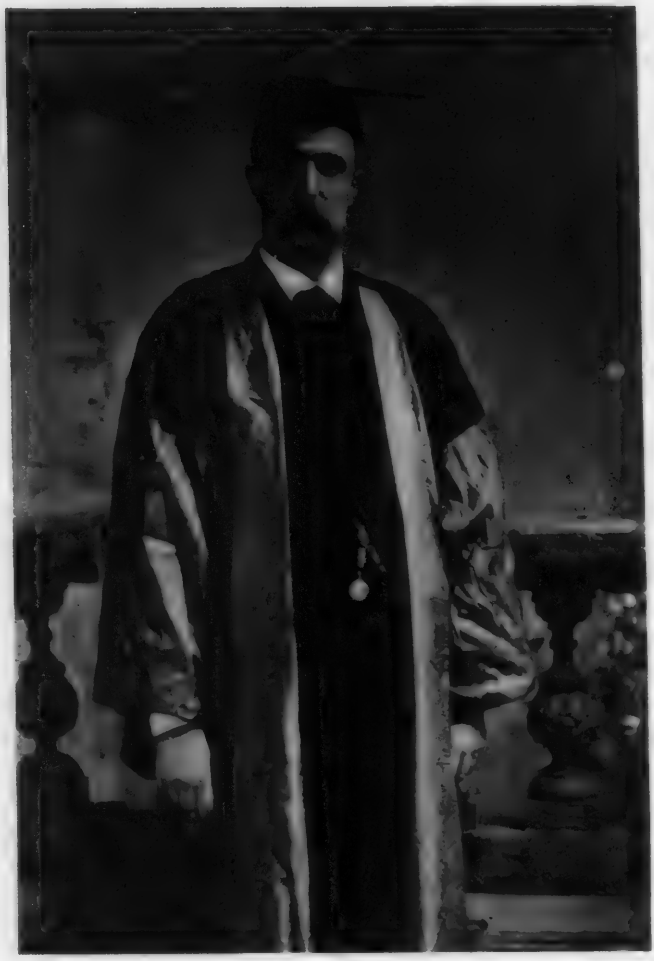

Fig. 6.

John Shaw Billings, aged 51. Photograph at the time of the conference of his degree of D. C. L. at Oxford.

. . . "Our museum, like the library with which it is associated, includes all the specialties. No physician is so learned or skillful that he can find no instruction there, and no one is so ignorant that he cannot comprehend some of the lessons which it teaches. Taken together these institutions should contribute to no small work and teaching it is an essential element, and if it be remembered that they are only twenty-five years old, and that during that period we have been making medical history at a tremendous rate, surely some incompleteness and crudeness may well be excused or overlooked" (p. 316).

Builder of Hospitals

Billings had become one of the best known physicians in America and his opinions and advice were sought in many fields and by many people. His studies of military hospitals had far reaching results. Not only did the Army acquire new and better buildings in general, but in the construction of hospitals he played a major rôle indeed.

The most important of the military hospitals erected under his supervision was the Barnes Hospital, named for Billings's good friend, Surgeon General Joseph K. Barnes, at the Soldiers' Home in Washington. It was a fifty-bed structure planned by him in 1873, being one of the "two permanent and rather expensive hospitals of the period," the other being the Cadet Hospital at West Point. One may read all about them both in "Circular No. 4," already mentioned.

In 1876 the Trustees of the Johns Hopkins Fund visited Dr. Billings in the Library, and induced him, with the Surgeon General's consent, to become their Medical Adviser. He was one of the five experts on hospital design asked to submit plans for the proposed Johns Hopkins Hospital. The other four were Drs. Norton Folsom, Joseph Jones, Caspar Morris, and Stephen Smith. The plans of Dr. Billings were selected as the best. "Si monumentum requiris, circumspice." I shall not attempt to describe the plans or the buildings. Suffice it to say that they both represented the most advanced ideas of the day. If one wonder at the rule that patients be not housed in the basement, that the several buildings be not above two or three stories, that no elevator shafts be tolerated, etc., it is necessary to remember that those were the days when Pettenkofer's *Boden*

Theorie was still accepted, and miasms and malarial eminations were supposed to arise from the soil. The floors were made impervious to such evils, by coats of asphalt, and there were careful schemes for the removal of foul air (cf. *Hospital Plans . . . Johns Hopkins Hospital*, N. Y., 1875, pp. 3-46).

The debt of the Johns Hopkins Hospital to Dr. Billings was partly repaid when the Professor of Surgery, Dr. William S. Halsted, there twice operated on him for cancer of the lip, and with such success that Billings was spared to round out his sixteen lustra of usefulness.

In 1905 Billings was engaged by the corporation of the proposed Peter Bent Brigham Hospital of Boston to lay out plans for that institution, and for many months he worked on the task. His recommendations were adopted and the hospital completed the year of his death. A full consideration of this phase of Billings's achievements is beyond the scope of this paper.

Professor of Hygiene

Billings occupied the chair of Hygiene in two of the country's most important medical schools, the Johns Hopkins University and the University of Pennsylvania. At both he gave of his wide experience and deep thought. A lengthy discussion of this phase of his work must be left to pens better qualified than mine. When I was a second-year medical student here, our class in Hygiene was taken to Washington by Dr. William W. Ford to see the Army Medical Library and Museum. To our good fortune Billings was there that day on a visit, probably it was the occasion of a meeting of the National Academy of Science, and we were afforded the privilege of seeing the sage in the setting which best became him. I recall his words of advice and encouragement to us and above all his brief and simple description of how to use the Library and to "look up the literature." Nothing could have been farther from my mind than the idea that I would myself one day be entrusted with the care of Billings's beloved books.

Part III

The Surgeon General's Library and Its Index Catalogue

"Dr. Billings," said Professor Welch, "was the greatest bibliographer in the history of medicine" (*Johns Hopkins Hosp. Bull.*, Baltimore, 1914, XXV, 253). The story of the Army Medical Library, and of its great *Index Catalogue*, has often been told, but cannot be omitted in any consideration of Billings's Army career (cf. E. E. Hume, *Mil. Surgn.*, 1936, LXXVIII, 241-267; *ibid.*, 1937, LXXX, 45-52; *Am. J. Psychiatry*, 1937, XCII, 259-270; *Johns Hopkins Alumni Mag.*, 1936, XXIV, 107-135; *Bull. International de Méd. Mil.*, Bruxelles, 1937, X, 1-10; *Army Med. Bull.*, Carlisle, Pa., Oct. 1936, No. 37, 1-28; *Compt. Rend.*, IX; *Congr. Internat. Méd. Mil.*, Bucharest, 1937, II, 255-260; *Science*, N. Y., 1937, LXXXV, 208-210; *Ann. Med. Hist.*, 1937, X, 282-284; *Isis*, Bruges, Belgium, 1913, XXVI, 423-447; etc.).

Of the great things that he accomplished, the greatest was the development of this library from a handful of books to the greatest in the country, and ultimately to become the largest collection of medical books the world has ever known. The most important part of this work was the conception and realization of the *Index Catalogue*, the greatest piece of bibliography in any field of knowledge. Superlatives are inevitable when we tell of Billings.

When Surgeon Billings was assigned to duty in the Office of the Surgeon General on the last day of the year 1864, the Library of the Surgeon General's Office, as it was then called, numbered 2253 volumes. Billings catalogued them in the Library's first printed catalogue (1865). This little pamphlet of 31 unnumbered leaves, alongside of the fifty ponderous royal octavo tomes of the *Index Catalogue*, serve as our most eloquent memorial to this great man. Osler styled it "Billings's float down to posterity."

Billings's interest in medical bibliography came originally from his difficulties in preparing a graduation dissertation at the Medical College of Ohio, now the University of Cincinnati. In his address there, thirty years later, he said, in part:

"The performance of that melancholy duty has not only influ-

Fig. 7.

The Index Catalogue of fifty volumes contrasted with the pamphlet catalogue of 1865 (at left). Taken together they serve as Billings's most eloquent memorial.

ceed the greater part of my work for the last twenty years, but is the essential though remote cause of my being here tonight.

"This has happened in this wise: In the thesis just referred to, it was desirable to give the statistics of the results obtained from certain surgical operations as applied in the treatment of epilepsy. To find these data in their original and authentic form required the consulting of many books, and to get at these books I not only ransacked all the libraries, public and private, to which I could get access in Cincinnati, but for those volumes not found here (and these were the greater portion), search was made in Philadelphia, New York and elsewhere, to ascertain if they were in any accessible libraries in this country.

"After about six months of this sort of work, and correspondence, I became convinced of three things. The first was, that it involves a vast amount of time and labor to search through a thousand volumes of medical books and journals for items on a particular subject, and that the indexes of such books and journals cannot always be relied on as a guide to their contents. The second is, that there are in existence somewhere, over 100,000 volumes of such medical books and journals, not counting pamphlets and reprints. And the third was, that while there was nowhere in the world a library which contained all medical literature, there was not in the United States any fairly good medical library, one in which a student might hope to find a large part of the literature relating to any medical subject, and that if one wished to do good bibliographical work to verify the references given by European medical writers, or to make reasonably sure that one had before him all that had been seen or done by previous observers or experimenters on a given subject, he must go to Europe and visit, not merely one, but several of the great capital cities in order to accomplish his desire.

"It was this experience which led me, when a favorable opportunity offered at the close of the war (1865), to try to establish, for the use of American physicians, a fairly complete medical library, and in connection with this to prepare a comprehensive catalogue and index which should spare medical teachers and writers the drudgery of consulting 10,000 or more different texts, or of turning over the leaves of as many volumes to find the dozen or so references of which they might be in search.". . .

In 1868 the sum of $80,000, left over from Civil War hospital funds, was turned over to Billings by the farsighted Surgeon General Barnes, and he began his great work of collecting and cataloguing medical literature. In 1871 he got out his first catalogue. It appeared in 1872 (454 pages with a supplement of twenty-six pages). A three-volume catalogue, each volume of the approximate size of the present *Index Catalogue*, appeared in 1873-1874. These works were lists only, not comparable to the later publication.

The catalogue of 1871 is introduced by the following memorandum:

"That there is need in this country of a medical library of this character is sufficiently evident from the fact that, in all the public medical libraries of the United States put together, it would not be possible to verify, from the original authorities, the references given by the standard English or German authorities, such as Hennen, Reynolds, or Virchow. No complete collection of American medical literature is in existence; and the most complete, if in this country, is in private hands, and not accessible to the public, while every year adds to the difficulty of forming such a collection as the Government should possess."

Billings envisaged something more than a mere list of the books in the library of which he had charge, for "all is not bibliography that pretends to be such." "Books," he said, "are properly compared to tools of which the index is the handle." He contemplated the most mighty piece of bibliography ever undertaken in medical science or in any other field. He considered that the profession of medicine was entitled to a catalogue in which under both authors and subjects the literature of the would could be found. He wanted the ideas of the leaders of scientific thought in every land, so, in 1876, he published a *Specimen Fasciculus of a Catalogue of the National Medical Library, under the Direction of the Surgeon General, United States Army*. This he submitted to the medical profession for criticisms and suggestions. Its style and arrangement were practically those of the present *Index Catalogue*, differing only in certain typographical details.

From 1876 on, Billings continued the preparation of the prospec-

tive *Index Catalogue*. At length in 1880, partly through the good offices of Dr. Abraham Jacobi, Congress made the appropriation for printing it.

The matter of typography and general arrangement of the contents having been settled in the *Specimen Fasciculus*, the main question was that of classification. "Following the general idea of a subject and author catalogue arranged in dictionary order in a single alphabet, the special subjects were featured by means of key titles or rubrics. After settling upon the main grand divisions, such as Aneurism, Cancer, Tumors, etc., and subdividing these, the subjects of lesser weight easily fell into their place by the simple device of finding the centers of gravity of the titles in each case" (Garrison). Dr. Billings saw clearly that he could not prepare a complete bibliography of his subject, but rather a bibliographical conspectus of the contents of a great library. Happily this proved so complete that it became, for practical use, a working bibliography of medicine. Modern medical science was even then beginning to advance by leaps and bounds, its surface aspect constantly changing as it advanced, so that he saw at once that it would be impossible to adopt any arbitrary and fixed classification based on a definite scheme of nosology. Any such scheme would have been, like the average medical textbook of today, obsolete within a few years.

The appearance of the *Index Catalogue* marked an epoch in the development and improvement of medical literature, particularly in the United States. Editors of medical journals, chiefs of clinics and laboratories, and physicians writing upon all branches of medicine, who formerly had to obtain historical, statistical, and other data in a most haphazard way, now had their materials ready to hand in the most convenient and accessible form possible, that is, the strictly alphabetical. The *Index Catalogue* has no equal. "Its preparation," said Osler, "is Gargantuan." In no other field of knowledge is there a work comparable to this, the world's standard of medical bibliography.

Billings used to say: "The Catalogue is a tool that must be used for a time before you can judge of its merits." Certainly it has been used to that point. Years ago Osler told of how worn and bethumbed were the volumes of the *Index Catalogue* in foreign medical libraries,

and I have myself seen the same condition recently in a dozen or so countries. The *Catalogue* as a working tool is in constant use in Tokyo, Stockholm, Buenos Aires, and way points. In his Schorstein Memorial Lecture, delivered at the London Hospital on October 17, 1935, Professor William Bulloch, F. R. S., said: "Among catalogues the Surgeon General's is regarded by the authorities at the British Museum as the greatest ever achieved. It has the great virtue of being a subject index, unlike that of the British Museum, which is a name index only. The story of its construction is not as well known as it ought to be." (*Brit. Med. Journ.*, October 26, 1935.)

When the *First Series* of the *Index Catalogue* was completed, Billings voluntarily sought retirement from the Army. His faithful collaborator, Dr. Robert Fletcher (1823-1912), continued the work with the *Second Series*, which was completed in 1916. The *Third Series* was published from 1918 to 1932, and though it looked for a time as though Congress might not authorize the continuation of the *Index Catalogue*, the *Fourth Series* was at length begun in 1936.

That other monumental piece of medical bibliography, the *Index Medicus*, was established by Dr. Billings in 1879. He placed it chiefly in the hands of Dr. Robert Fletcher. The two men, as Osler once remarked, "worked beautifully together."

The *Index Medicus* consisted from the start of a carefully printed monthly fasciculus, giving the medical literature of the preceding month arranged as to subject-rubrics. The classification, as covering a smaller body of material, is more general and less subdivided than that of the *Index Catalogue*, the scheme of nomenclature and nosology being, as the editors stated, essentially that adopted by the Royal College of Physicians of London, "based upon Dr. Farr's well-known system." In the early issues of the *Index Medicus* a special page of medical "Notes and Queries" was included, consisting of questions and answers bearing upon rare books and editions, and other matters of medical bibliography and history. At the end of each volume of twelve numbers, an annual author and subject index of the whole material was prepared, the subject index being minutely subdivided, forming, in respect to classification, a sort of annual *Index Catalogue* en miniature.

Never a Government publication, the *Index Medicus* had hard financial sailing from the start. It was expensive to publish and though of the greatest use, the number of its subscribers was necessarily limited, being chiefly medical libraries. From January 1879 (Volume I) to April 1899 (Volume XXI) it was published successively in New York, Detroit, Boston, and Washington. Then came the time when its founders could no longer afford to continue it. In vain did Osler plead before a meeting of the American Medical Association that physicians subscribe. *Bibliographia Medica*, under the redaction of MM. Charles Richet and Marcel Baudouin, was issued in Paris as a replacement for the *Index Medicus*, from 1900 to 1902, three volumes having been published. In 1903 the Carnegie Institution of Washington (Billings was chairman of the Board) took over the *Index Medicus* and the second series edited by Drs. Fletcher and Garrison ran from 1903 to 1920, eighteen volumes in all. In 1921 the third series began and continued until 1927 when the *Index Medicus* was merged with the *Quarterly Cumulative Index* (founded 1916) of the American Medical Association. The combined periodical, the *Quarterly Cumulative Index Medicus*, was published under the joint direction of the Army Medical Library and the American Medical Association until December 1931, when its connection with the Library ceased and it became solely a journal of the Association.

To find practically everything that has been written on a specific subject, it is merely necessary to look in the alphabetically arranged *Index Catalogue*. For example, in order to find the literature of, say, fractures of the clavicle, on simply refers to the C volume of the *First Series* of the *Catalogue* where under Clavicle, Fractures of, there are listed first the books, then the theses, and finally the articles in the medical journals of the world, all that had been collected on this topic from the early days down to the date when this particular volume of the *First Series* went to press: 1882. Next, in the C volume of the *Second Series*, the material on this subject that was indexed between 1882 and 1893, the date of its printing, would be found. Similarly in the C volume of the *Third Series* the material from 1898 to 1922 would be recorded, 1922 being the date that this volume of the *Catalogue* went to press. For material since

1922 the card index of the Library is available. Moreover, by taking the annual volumes of the *Index Medicus* from 1922 to date, the bulk of the remaining medical literature on our selected topic would be found, though the Army Medical Library indexes considerably more material than does the *Quarterly Cumulative Index Medicus*. How simple, yet how often does the Library receive letters asking how the literature on any subject may be "looked up!"

Garrison, himself one day to become assistant librarian, told of a conversation with the then holder of that office, Dr. Robert Fletcher. In his whimsical way Fletcher "likened the *Index Catalogue* to a vast metropolitan hotel containing story after story of rooms and suites of rooms of all sizes and prices, adapted to the tenants of every degree of income and worldly place. In such a caravansary, some subjects like Labour, Surgery, Water Supply, etc., are old wealthy patrons having a permanent claim upon apartments of vast extent, occupying an entire floor. Others, such as Acupuncture, Amulets, Animism, are on such a slender financial footing that they must put up with hall bedrooms or be 'cabined, cribbed, confined' in the attic. Others, such as Arteriosclerosis, Bacteriology, Parasitology, Pellagra, Poliomyelitis, were once poor and needy, but, having come up in the world acquire extensive suites, with rooms perchance for even maid and courier. Others, such as many modern drugs, diagnostic tests, and surgical procedures, are bounders and get-rick-quick parvenus, who exhaust their substance in vain and vulgar show, fading away as soon as their credit is gone." Dr. Fletcher's picture is still a true one, and the librarian and editor of the *Index Catalogue* must still seek, like mine host of a large hotel, to accommodate the guests in apartments of the proper size and position, though not without a careful eye on the guest's probable ability to pay his reckoning.

Billings once said that a librarian is in one respect only a sort of hodcarrier, "who brings together the bricks made by one set of men in order that another set of men may build therewith—but he is apt to take quite as much pride and satisfaction in the resulting structure, provided it be a good one, as if he built it himself." Thus does he differ, I may add, from the hodcarrier of the ancient Irish story, who felt that all he had to do was to carry the bricks to the top of the wall and the man there would do all the work!

Between 1865 and 1887 the Surgeon General's Library was merely a growing collection of books. In cramped quarters over the old Rigg's Bank at the corner of Fifteenth Street and Pennsylvania Avenue, the Surgeon General and his assistants carried on. Here, among other official business, all new accessions in the way of books, pamphlets, and theses were ticketed and catalogued, after which they were sent to the Library Hall in Ford's Theatre, that melancholy scene of President Lincoln's assassination, by this time

Fig. 8.

The Army Medical Library and Museum, Washington.

used by the War Department, largely as a storehouse. So small were the quarters over Rigg's Bank that the boxes of books had to be opened in the back yard. The necessary appropriations for the Library were eventually made by Congress, and its collections began to grow rapidly.

Congress in 1885 appropriated $200,000 for the purpose, and in 1887 the large three-story building for the Army Medical Library and Museum was completed and opened to the public. (*Med. News*, Phila., XLIX, 330.) It is situated at the corner of Seventh Street and Independence Avenue (then known as B Street), Southwest. Billings wrote a friend: "I feel more or less satisfied, at least for the present. The building is a plain brick structure, light, and thoroughly ventilated." The Library occupies roughly half of the

Fig. 9

Atlanta Health Needs Medical Library Washington

building, including the huge Library hall, containing the book stacks into which forty two-horse wagon-loads of books were transferred. The other half of the building is devoted to the Army Medical Museum of which Billings was curator likewise. This Museum, the largest of its kind in the world, is a worthy sister of the Library.

Happily the new building was occupied before the Congress of Physicians and Surgeons, of which Billings was the president, met in Washington in 1888. A great reception was held there. Among the foreign visitors was the distinguished German military surgeon, Friedrich von Esmarch, who with his wife was Dr. Billings's personal guest. By his marriage with this lady, who was a royal princess, Esmarch became uncle-in-law to the German Emperor, William II.

Billings added to the Library's collection not only through appropriations. By means of exchanges and gifts and by ransacking such private collections as were generously thrown open to him he obtained many rare desiderata and filled many lacunæ. Dr. Oliver Wendell Holmes humorously described a visit by Billings to his library in Cambridge; how, directly on entering the room, Billings swept the shelves with a keen glance and selected the most valuable book in the collection, looked at it for a moment, put it back on the shelves, took another look around, and easily found the second book in the scale of values. "Why sir," said Holmes, "Dr. Billings is a bibliophile of such eminence that I regard him as a positive danger to the owner of a library, if he is ever let loose in it alone."

For all this the "Autocrat of the Breakfast Table" was one of those who strongly urged Congress to make suitable appropriation for the *Catalogue*. "When we have a noble library like that in Washington," said he, "and a librarian of exceptional qualifications like the gentleman who now holds that office, I believe that a liberal appropriation by Congress to carry out a conscientious work for the advancement of sound knowledge and the bettering of human conditions, like that which Dr. Billings has so well begun, would redound greatly to the honor of the nation. It ought to be willing to be at some charge to make its treasures useful to its citizens, and, for its own sake, especially to that class which has charge of health, public and private."

In the early days of the Army Medical Library, books had to be consulted in the reading rooms and could not be loaned outside the building—except to a few trusted souls to whom Billings extended this privilege. Osler was one of these, but once he left a rare book on the train from Washington to Baltimore, and it was never recovered. For all that they were the best of friends—and remained so to the end, Billings punished Osler for this loss of Peacock's *Malformations of the Heart*, by depriving him for a year of his privilege of taking books from the Library. The professor of medicine of Johns Hopkins had to make many a trip to Washington for books that he could not find in Baltimore or Philadelphia.

In 1891 the youthful Fielding Hudson Garrison (1870-1935) received his baccalaureate in arts at the Johns Hopkins, and joined the staff of the Army Medical Library as a junior clerk. His imagination was fired by Billings's example and guidance. He studied medicine at night and lived to become his master's most distinguished pupil in medical bibliography. He gave us our best account of Billings's life and work: *John Shaw Billings—A Memoir* (1915), a work which he confessed to Sir Humphrey Rolleston, took more vitality out of him than anything else he ever did. No one could write of Billings without drawing liberally, as I have, from this splendid biography. Garrison succeeded Fletcher in the redaction of Billings's brain-child, the *Index Medicus* (cf. E. E. Hume, *Bull. Inst. Hist. Med.*, Johns Hopkins Univ., 1937, V, 301-346).

In the introduction to the last volume of the *First Series* of the *Index Catalogue*, Billings wrote a sort of valedictory:

"This is probably the last volume of the *Index Catalogue* which will be issued under my personal supervision, and, in closing the work, I can only say that it has been to me a 'labour of love,' and that I am very thankful that I have been allowed to complete it, so far as the first series is concerned."

Garrison tells us that Billings, with his unerring judgment of men, selected Dr. Walter Reed (1851-1902) his successor as Librarian. That brilliant young medical officer was just completing his epoch-making studies of the relationship of the mosquito to

Fig. 10

John Shaw Billings, aged about 57. Photograph at about the time of his retirement from the Army, 1895.

yellow fever, so that he was not available to serve at that time at the Library. Seven years later, however (1902) he was made Librarian and thus attained "the highest ambition of his life" as he expressed it to Dr. Garrison (*Billings—Memoir*, p. 179 n.). He held the office but a single week, for his career was cut short by his untimely death at the age of fifty-one from a ruptured gangrenous appendix.

Dr. Reed was succeeded in the following year by the scholarly Dr. Walter Drew McCaw, who was Librarian until 1913, and who in the World War was to become Chief Surgeon of the American Expeditionary Force in France. He thus described Billings's military career:

"He undoubtedly had the marking of a great soldier. He would have made a great general. He would have made a most able prime minister, and he would have had his own way. He would undoubtedly have made a great ruler, probably an easier position to fill." (*Johns Hopkins Hosp. Bull.*, 1914, XXV, 246.)

Dr. Welch was one of the most constant users of the Army Medical Library. On the last visit he paid to Washington, not long before his final illness, he was sitting in the Librarian's office smoking one of his black cigars, when he fell into one of those reminiscent moods so enjoyed by his friends and pupils. He spoke of the foundation of the Library, of its growth, of the place it had made for itself in the world of medical science, and then said:

"I have been asked on more than one occasion what have been the really great contributions of this country to medical knowledge. I have given the subject some thought and think that four should be named:

1. The discovery of anæsthesia.
2. The discovery of insect transmission of disease.
3. The development of the modern public health laboratory, in all that the term implies.
4. The Army Medical Library and its *Index Catalogue*, and (he added slowly), this library and its catalogue are the most important of the four."

Dr. Welch was not one to speak lightly or without due thought. I

was so struck by this pronouncement, that I reduced it to writing immediately after the doctor had left. I crave pardon in quoting it again here, for it has already appeared a number of times in print. It was not Dr. Welch's first statement of the kind, for in 1914 he had written:

"I question whether America has made any larger contribution to medicine than that made by Billings in building up and developing the Surgeon-General's Library and in the publication of the *Index Catalogue* and the *Index Medicus*. That in my judgment is our greatest contribution to medicine and we owe it to his extraordinary man" (*Johns Hopkins Hosp. Bull.*, 1914, XXV, 252).

It is noteworthy that those interested in each of the many fields in which Billings excelled, feel that his contribution to that particular activity was his masterpiece. There could hardly be more convincing proof of Billings's extraordinary genius.

It has sometimes been said the Billings *magnum opus* was the New York Public Library which was built under his direction, the collection being the result of the consolidation of the three public libraries of the metropolis. Gigantic as this work was, it must, we feel, be reckoned as second to the Army Medical Library. Such, certainly, was the consensus of opinion expressed by many savants at the celebration of the centenary of the library on November 16, 1936. Sir Humphrey Rolleston, Baronet, former Professor of Physic at Cambridge so expressed himself in his ovation on that occasion.

Portrait of Dr. Billings

Miss Cecelia Beaux painted the best known of the likenesses of Billings. A group of admiring friends in America and Britain subscribed to the portrait fund and the painting was executed in 1895, the year Billings retired from active duty in the Army.

The artiste wrote the Librarian of the Army Medical Library in 1937:

"The portrait was one of the first commissions I had on my return to Philadelphia after my first trip to France for study—and I was very proud of having it entrusted to me. It was painted at my studio, 1710 Chestnut St. [Philadelphia]. I fully felt that I was

dealing with a great personality, very quiet and serious, as in the performance of duty. He never failed or would admit fatigue. I think he felt also that I would earnestly pursue what I had undertaken, and he would do all he could to assist me. His personality seemed to me of the noblest and highest, and of course the most direct and simple. I only remember this. I am sorry that all the details except the gown, have disappeared. I was completely absorbed in the power of the head, and all my zest and energy were turned towards dealing with such a splendid example. He had agreed to pose for his portrait and he did his part with appreciation and grace. This of course was an assistance to me, the deepest and most potent, and it was his nature to contribute this unconsciously.

"Doctor Billings never expressed an opinion about the portrait, but I think it possible that he took notice of the processes. I felt what an inspiration his character would be to any worker, and was thankful that I was permitted to observe for a short time the external evidence of such a spirit." (H. W. Jones, *Ann. Med. Hist.*, 1937, n. ser., IX, 532.)

The portrait is inscribed: "John S. Billings, in Charge of Library, 1865-1895, Presented by 260 physicians of America and Great Britain." Among the American subscribers were: Chadwick, Bowditch, Fitz, Guiteras, Hare, de Schweinitz, Da Costa, Darrach, Dyer, Hurd, Halsted, Jacobi, Janeway, Kelly, Keen, Lewis, Lusk, Mitchell, Musser, McBurney, McGuire, Matas, Sayer, Shattock, Starr, and Welch. Among the British donors were: Lord Lister, Acland, Broadbent, Ferrier, Flower, Horsley, Humphreys, Little, Paget, Power, Russell, Osler, Reynolds, Smyly and Treves. The complete list is given in *Medical News, Philadelphia*, 1895, LXVII, 640-641.

Billings was greatly honored even in his lifetime. His brevets for meritorious service in the Civil War have been mentioned. The Universities of Edinburgh, Harvard, Munich, Dublin, Oxford, Budapest, Yale and Johns Hopkins gave him Doctorates, *honoris causa*. He held membership or fellowship in many learned societies, including The Royal College of Physicians of Ireland, The Royal Medical Society (London), The Ärtzliche Verein (Munich), The Medical Society of Sweden, The Société Française d'Hygiène, The

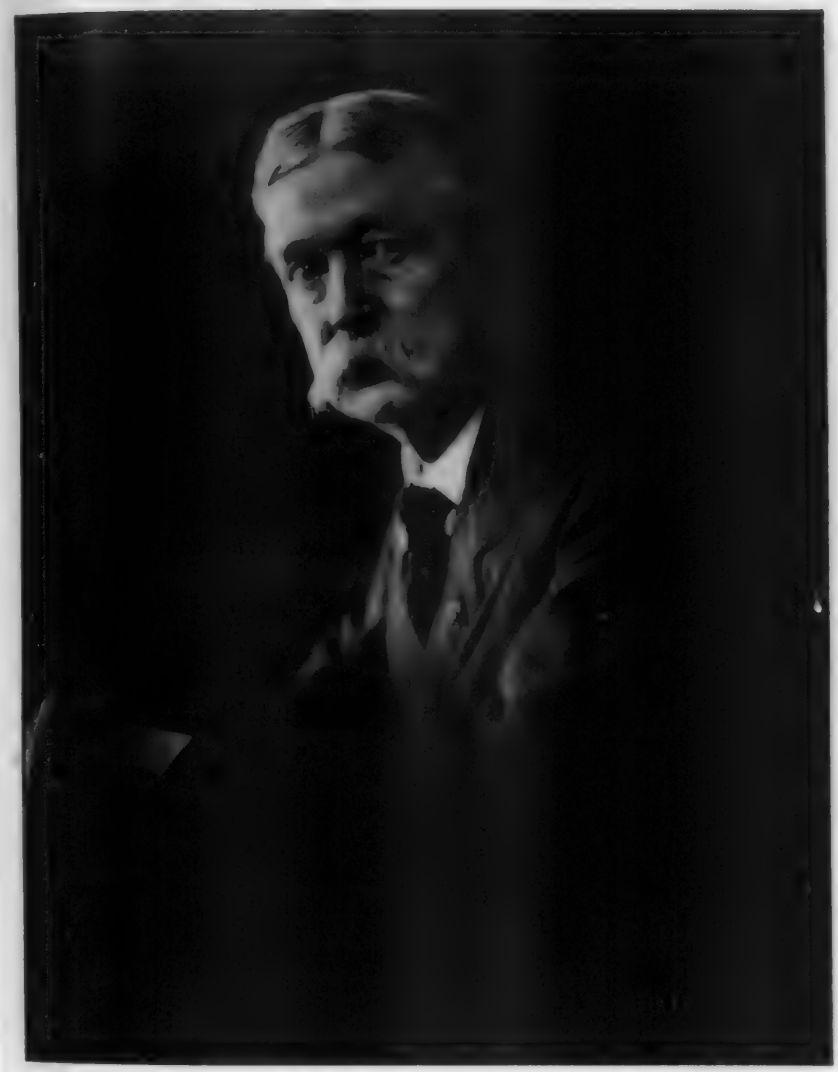

Fig. 11.
John Shaw Billings, at the age of 70.

Association of American Physicians, The National Academy of Sciences (U. S.), The American Academy of Arts and Sciences, and The American Philosophical Society.

The number of distinguished medical officers on the roll of the United States Army is not small: Shippen and Morgan, founders of America's first medical school (the University of Pennsylvania); Rush, signer of the Declaration of Independence; Lovell, father of modern weather reporting; Brown, writer of the earliest American pharmacopœia; Beaumont, physiologist of digestion; Letterman, pioneer in the organized evacuation of wounded from the field of battle; Sternberg, the bacteriologist; Reed, demonstrator of the causal nexus of the mosquito and yellow fever; Gorgas, the successful sanitarian; Hoff, the military-medical organizer; Ashford, pioneer in hookworm eradication; Leonard Wood, the military commander; Garrison, medical historian; and many more, some still living and who must therefore not be mentioned by name. Comparisons are even more odious in the military service than elsewhere, but the author of a private paper is entitled to his opinion; and I give it as mine that Billings was our greatest. And in this University and in this hall of all places, a Johns Hopkins man may appropriately quote the words of Dr. William Henry Welch:

> "Of all the men I have ever known, he was the wisest."
>
> (*Johns Hopkins Hosp. Bull.*, 1914, XXV, 252).

JOHN SHAW BILLINGS AND THE JOHNS HOPKINS MEDICAL SCHOOL; A TRIBUTE ON THE ONE HUNDREDTH ANNIVERSARY OF HIS BIRTH *

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The occurrence this year of the one hundredth anniversary of the birth of John Shaw Billings (April 12, 1838) offers an opportunity to pause for a moment and reflect upon the achievements of one of the leading figures in American medicine. There is a particular reason why those connected with the Johns Hopkins Hospital and the Johns Hopkins University School of Medicine should take note of this centennial anniversary. That reason lies in the outstanding services which Billings rendered to both of those institutions in their early days, services of such a character that they justly entitle him to be regarded as one of the founding fathers of both the Hospital and the Medical School. It would seem to be an appropriate time, therefore, to examine once again the nature and extent of the contributions which he made to those two institutions. For a staff member of either one of them to conduct such an examination is in a very real sense of the word an act of filial piety.

Billings' services to the Hospital in planning the original buildings of that institution and supervising their construction are so obvious and received so much attention at the time, both in this country and Europe, that they have tended to overshadow his services to the Medical School. These latter, while much less obvious in their results than the planning and supervising services to the Hospital, were of the greatest importance to the School which was to be, for they dealt with the fundamental questions of the proper organization of that School and the choice of its first personnel. It has been thought

* Presented at the joint meeting of the Johns Hopkins Historical Club and the Johns Hopkins Medical Society, held to commemorate the one hundredth anniversary of the birth of Dr. Billings. The meeting was held in the Hurd Memorial Hall, April 12, 1938, with Judge Henry D. Harlan, President of the Board of Trustees of the Johns Hopkins Hospital, presiding.

desirable, therefore, to confine this particular tribute to the relation of Dr. Billings to the organization of the School of Medicine. Before setting forth this relationship, however, it may be worth while to sketch briefly some of the important steps in Billings' career prior to his connection with the Hospital and the University. For this material the writer has drawn freely upon Garrison's memoir[1] and upon the addresses which were delivered at the special meeting of the Johns Hopkins Historical Club held in memory of Billings on May 26, 1913,[2] and at the memorial meeting held at the New York Public Library on April 25, 1913.[3]

Billings was born in Indiana of stock that had migrated to the West from New England. He was a lineal descendant of the John Howland who came over in the Mayflower. When he was about five years old his father moved the family to a farm in Rhode Island and there during the next five years the young boy learned something of the difficulty of wringing a living out of the stony New England soil, enough at any rate to convince himself that he did not wish to become a farmer. The family moved back to Indiana when he was ten years old and his father opened up a country store in a small cross-roads village (Allensville). As a boy he was an inveterate reader and at the age of 15 bought himself a Latin dictionary and grammar and a copy of Caesar, determined to learn enough Latin to translate the quotations he encountered in his reading. He also studied Greek on his own initiative and fitted himself for entrance into Miami University at Oxford, Ohio.

The family had small means and Billings had to work his way through college, living on a very scanty diet. It is related by Weir Mitchell that one winter while in college Billings lived on only 75 cents a week, his meals consisting almost entirely of milk and eggs.[4] He graduated from college in 1857 and in 1858 entered the Medical College of Ohio, located in Cincinnati, from which he graduated in 1860. While a student he became an interne in St. John's Hospital

[1] Garrison, F. H. John Shaw Billings, a Memoir. New York and London. G. P. Putnam's Sons. 1915.

[2] The Johns Hopkins Hospital Bulletin, 1914, 25, 244.

[3] Bulletin of the New York Public Library, 1913, 17, 511.

[4] *Ibid.*, p. 513.

and later in the Commercial Hospital and on his graduation he was appointed a demonstrator in anatomy in the college, a post which he held for two years. He was offered an opportunity to become an assistant to a well known surgeon in Cincinnati but declined in order to enter the Union Army in April 1862, passing first in the group which took the examinations for commissions in the regular Army. This was at the age of 24.

At once he attracted the attention of his superiors and was placed in charge of the Union Hotel Hospital. Later he was given the task of converting a cavalry barracks into a military hospital, the Cliffburne Hospital near Georgetown, D. C. In March 1863, he was assigned to duty with the Army of the Potomac and came under fire at the Battle of Chancellorsville where he had the difficult task of moving a field hospital full of wounded and keeping in touch with the retreating Union army at the same time. He was in command of a divisional field hospital at the Battle of Gettysburg, located near Little Round Top, and handled a great number of wounded from that engagement. Subsequently he became attached to the Headquarters of the Army of the Potomac and served through the Wilderness campaign and the siege of Petersburg. Shortly before the close of the war he was ordered to the Surgeon General's office in Washington.

Billings would probably have become one of the leading surgeons of the country had he elected to go into practice at the end of the war, for he had shown himself to be a very capable operator, but his interests lay in other directions and he remained in the Army, being attached to the Surgeon General's Office. At the request of the Secretary of the Treasury he undertook a survey of all of the hospitals conducted by the Marine Hospital Service, an assignment which gave him a thorough grasp of the problems of hospital construction and management. This survey together with his report on Army Barracks and Hospitals, which appeared in 1870, established his reputation as an authority on hospital construction, and it was only natural that the Trustees of the Johns Hopkins Hospital should include him in the list of 5 experts on hospital construction whom they invited to submit plans for the new hospital. As is well known, his plan was accepted and he was engaged by the Trustees to super-

vise the construction of the buildings. He took up these duties on July 1, 1876, at which time he was but 38 years of age. He also accepted an appointment as Lecturer in the History of Medicine in the Johns Hopkins University during that same year. Thus began a connection with the two Hopkins institutions which was destined to continue for many years and to be of great value to both of them.

From the very outset Billings was keenly interested in the organization of the Medical School, and he showed this interest by setting forth his own views on the subject in a series of papers and official communications. In the original plan for the Johns Hopkins Hospital which he submitted to the Hospital Trustees in competition with the other experts,[5] he considered first of all the relations of the Medical School to the Hospital and laid down the principle "that the plan of the Hospital must depend upon the extent to and the manner in which it is to be used as an instrument of medical education, and upon the more or less intimate connection which it is to have with the Medical School." He went on to emphasize the point that the Medical School was in a position to do something different from the existing medical schools of the country and that it should take advantage of that fact. He was of the opinion that the classes should be severely restricted in number, that there should be a high standard of admission, a four year's course, rigid examinations and practical work in the dispensary and the wards. In this same document he also stressed the principle that the Hospital, besides caring for the sick poor and aiding in the education of physicians and nurses, should have as a third objective the promotion of discoveries in the science and art of medicine.

After his selection as adviser by the Hospital Trustees he submitted to that body under date of July 15, 1876, the first of a series of reports dealing with the construction and organization of the Hospital. In this report[6] Billings enlarged upon the idea that the Hospital should endeavor to promote discoveries in medicine. While the institution should rightly contribute to charity, still, in Billings'

[5] Hospital Plans, Johns Hopkins Hospital, Baltimore. New York, William Wood & Co., 1875.

[6] Johns Hopkins Hospital. Reports and papers relating to construction and organization. No. 1 (Baltimore, 1876).

opinion, care was to be taken "not to narrow and restrict the benefits of this charity." The good the Hospital might do was not to be limited solely to those who were patients within its walls; the sick and afflicted of all countries were to be benefited because the institution was expected to advance our knowledge of disease and the power to control it. He then went on to urge that the amount to be expended on the buildings should be sufficient to provide adequate space and equipment for the staff to study their patients carefully and minutely, since such an opportunity would be bound to attract good men even more than high salaries, and would do much to keep them "good." For this reason he definitely rejected the idea that the Hospital should be built upon a less expensive plan.

He next discussed the general principles upon which the Medical School should be organized since its organization would affect that of the Hospital. In this part of his report he again emphasized the point that the Medical School should attempt to do work which was not done elsewhere in the country, or not done well, and he pointed out that one of the objects of the School should be to train men to be original investigators since that object did not enter into the plans of the schools existing in the United States at that time. He also pointed out the need for men properly qualified to act as health officers, and expressed the hope that the Medical School would train such men, and he emphasized the need for instruction in the diagnosis, treatment and jurisprudence of insanity, and in the diseases of children.

He then proceeded to enunciate his second general principle which was that the knowledge which the students were expected to obtain was to be mainly acquired from observation, experiment and personal investigation, not from text books and lectures. This would necessitate more extensive facilities in the shape of rooms, instruments and apparatus and would mean that the classes would have to be small, a condition which Billings distinctly favored. A third general principle in organization, which Billings asserted in this report, was that time and labor were not to be wasted upon students not fitted to receive the kind of instruction which it was supposed to give, and he advocated rigid examinations that would exclude such students from the later years of the course.

In the autumn of the same year in which he submitted that first report (1876) he went to Europe to study the arrangements in the more important hospitals in Great Britain and on the continent, and to obtain criticisms and suggestions concerning his own plan for the Johns Hopkins Hospital. On his return he presented the results of his observations to the Trustees of the Hospital in the form of another report, the third in the series,[7] and because of the interest which this document aroused in those who saw it, Billings was subsequently prevailed upon to give a lecture to the medical profession of Baltimore on the material covered in that report. The lecture was delivered on February 5, 1877, and was printed in the Medical Record.[8]

In the following autumn (1877) he began a series of twenty lectures before the University on the History of Medicine, Medical Legislation and Medical Education. One of these, delivered on December 6, 1877, should be of particular interest to Hopkins people because in it he posed and answered the following question: "In view of the present condition of Medical Education in this country, how should the Johns Hopkins University organize its Medical Department?" His answer to that question covered 42 printed pages of small type. The lecture was printed for circulation amongst the Board of Trustees but never received general distribution and only recently was re-discovered in the University files. It is being reprinted in full in this issue of the *Bulletin of the Institute of the History of Medicine,*[9] so that those who are interested may easily consult the entire text. It may not be amiss, however, to summarize here the principal points which Billings brought out in that lecture, for the questions which he discussed and the proposals which he made reveal what a clear understanding he had of the problems of medical education and how completely he was aware of the unique opportunity in that field which was presented to the Johns Hopkins University.

In the lecture Billings began by emphasizing the desirability of

[7] *Ibid.*, No. 3.

[8] Medical Record, 1877, 12, 129.

[9] Bulletin of the Inst. of the History of Medicine, Johns Hopkins University, 1938, 6.

the University establishing a medical course such as is not likely to be given in other medical schools, and then went on to say that it should aim to make practitioners, " better trained and more skilful than those of other schools, but still practitioners." An absolute necessity for this purpose was an abundance of clinical material, according to Billings, in order that disease might be studied in the patient at the bedside.

The second aim of the School, according to Billings, should be " the promotion of original research and discovery in Medicine, including the making known of these discoveries." He commented on the absence of any organized effort at medical research in the United States of that day and pointed out in vivid fashion the great opportunity in this field which lay before the new institution, so " free from hampering customs, traditions and political necessity," and possessing the means to attract good men for the work. Not only should the new school endeavor to promote research, in Billings' opinion, but it should also train men to carry on research. And this research was not to be conducted solely because of its immediate practical bearings but rather because of the obscurity and imperfection of our knowledge, and of the satisfaction that comes from exploring the unknown. " What is desired is that the Medical Faculty shall increase knowledge—and shall fit its students to increase knowledge,—and that its attempts to do this shall not be restricted or limited by the fact that a part of its own work is to teach the practical applications of this knowledge. Let this last be the secondary and not the primary object, and by so doing we shall be free to do, and shall have the means to do, work which is not only highly desirable, but which cannot be done elsewhere."

From this point Billings went on to discuss how the objects which he had formulated might best be attained, and took up the consideration of the kind of students desired and how they were to be selected. " It is agreed on all hands that our existing Medical Schools have no satisfactory standard," said Billings, " and that this University should set a good example in this respect." He held that the students should be trained in Mathematics, Natural History, the Physical Sciences and Logic, and advised that " the Baccalaureate degree of the University be made an indispensable pre-

requisite to its degree of Doctor of Medicine." He also advocated the restoration of this last-mentioned degree to its original meaning, which signified that the holder was entitled to teach Medicine as well as practise it, that he was, in short, a master in his field. Billings explicitly stated that no man should receive the M. D. degree who had not studied Latin and could not read French and German with comparative ease.

Having settled the character of the preliminary education to be demanded of the matriculant, Billings next proceeded to discuss the curriculum of the Medical School, taking the ground that it should be neither too rigid nor too indefinite. He was of the opinion that the average medical student is not competent to make a wise choice of his studies and does not know his true interests, and while the students of the new school were expected to be better educated, and hence probably more competent to select their own studies themselves, still it would be advantageous to plan a curriculum for them, if only from the standpoint of advice. What lines should such a curriculum follow?

Billings answered this by allowing two years for the conventional studies of Anatomy, Physiology, the applications of Chemistry to Medicine, Materia Medica, and the general principles of Pathology and Therapeutics. In this connection he made a decidedly novel suggestion, namely, that there be incorporated in the second year a course in what he calls "comparative medicine," with "clinical facilities such as would be afforded by a small establishment for the cure of diseased animals." Such a course, in Billings' opinion, would be of value not only because of what it would contribute to the promotion of veterinary medicine, but also "for the sake of the great amount of instruction which by its means can be imparted to the student before he is brought face to face with disease in the human subject."

In discussing the teaching of the clinical subjects he began with a consideration of the proper organization of the clinical departments and, after pointing out how in England the clinical teachers belong to the Hospital and the Medical School is an appendage or protégé of the Hospital, whereas in Germany and France the clinical teachers belong to the Faculty and more or less control the

Hospital, went on to discuss the peculiar relationship presented by the Hopkins situation, where " the Hospital is a totally distinct trust from the University, with its own funds and officials, yet it is to form a part of the Medical School." He made the sage observation that " the question of funds would probably decide the question as to whether the clinical teachers should be more immediately dependent on the Hospital or the University, but of course they should be perfectly acceptable to both, and the responsibility must be to a certain extent divided."

Billings next considered the facilities which the Dispensary would offer the student for the observation of disease in the human being and he expressed the hope that it would be practicable to establish, in connection with the Dispensary, " a system of Medical attendance upon the poor at their homes, a large part of the work of which can be done by advanced students under the advice and direction of the clinical teachers." He pointed out that the Hospital was planned to provide for the residence of about 25 students, in addition to the " Medical Officers proper," and the senior students who would live in the Hospital would each have charge of a specified number of beds. Billings was strongly of the opinion that the classes should be limited to 25 students, and thought that it would be a long time before this number would be reached. He considered that it would be time enough to talk about increasing the size of the classes when the clinical material afforded by the wards and the Dispensary had increased beyond what was then contemplated.

The question of examinations was next considered and it was concluded that they should be given at the end of the first year of study, also prior to entrance into the clinical subjects and at the end of the course. Billings advocated that outside examiners, representing the public, participate in the final examinations for the degree, but thought that they were not needed for the earlier examinations.

He made a plea for the inclusion in the curriculum of a course in the History of Medicine, giving sound reasons for his views, and then discussed the amount of attention to be given to the clinical specialties in which he was obviously not greatly interested. From this he went on to a consideration of the special studies included

under what he called "state Medicine," by which he meant preventive medicine and the "relations of Physicians as individuals, and as a body, to the state." Under this term he included "Registration and Vital Statistics, Public Hygiene, Forensic Medicine and the legal relations of medical men to the public and to each other." As might be expected he made a strong case for instruction of the student in these matters, pointed out the great need of medical men properly trained in the whole field of Public Hygiene, and expressed the conviction that the University should endeavor to train such men, even going so far as to outline the subjects which they should study and stating that they should receive a "special Certificate" or diploma setting forth their particular qualifications. He also made a case for the training of physicians in Medical Jurisprudence and in so doing paid his respects to the professional "experts" in words that leave no uncertainty as to their meaning.

Billings next passed on to the question of mental disease, made a very impressive argument for study and training in this field, and expressed the hope that the University would make such arrangements with the institutions in the environs of Baltimore as would permit their use for teaching and the acquisition of new knowledge, and would, in turn, be of help to the institutions themselves. Finally, he pointed out the need of a Medical School for the Army and Navy and suggested that the University might well try to fulfill that need in view of its proximity to Washington. The blueprint which he gave of the proposed Medical School in this lecture was as broad and as complete as his plan for the Hospital, and there have been few developments which were not foreshadowed by him in 1877.

As one re-reads these papers of Billings, written sixty years ago, one cannot fail to be impressed with the wisdom of the man and the breadth of his vision in the field of medical education. Even though his own experience in formal medical education had been very meagre and his career had led him into other channels, nevertheless at the age of 38 he was exhibiting an understanding of the problems of medical education and a comprehension of the opportunities in that field which would have done credit to one who could claim a much more intimate knowledge of the subject and a much longer experience with it. There is no doubt that Billings knew

what a university medical school should be and what a teaching hospital should be.

Billings' contribution to the Medical School was not limited to the writing of reports or the delivery of lectures in which important questions of organization or policy were discussed. He took an active part in the deliberations of that first nucleus of the Medical Faculty which was organized in January 1884, and later on, when the time came for the selection of the staff of the Hospital, he played a very important role as adviser to President Gilman and the Trustees. He was himself a member of that first Medical Faculty, with the title of Professor of Hygiene (which was subsequently changed), the other members of which, in addition to President Gilman, were Ira Remsen, Professor of Chemistry, and H. Newell Martin, Professor of Physiology. This, the first officially constituted Medical Faculty of the University, held three meetings in January, 1884, at which the general plans for the organization of the Medical School were formulated. Later on in the same year, when Dr. Welch was appointed Professor of Pathology, he too was made a member of the group.

Garrison has stated that the selection of Dr. Welch as Professor of Pathology in the University "was made largely at the instance of Dr. Billings and Professor Julius Cohnheim of Breslau." It is of course difficult if not impossible to attribute to each his proper share of the credit. It is known that when President Gilman went to Europe in the summer of 1883 he carried with him a mandate from the Trustees of the University to find a Professor of Pathology who should also be the Pathologist to the Hospital, and it is also known that he consulted Cohnheim, who suggested the appointment of Welch. But it is also known, from Billings' own statement,[10] that he was acquainted with Welch prior to the latter's selection as Professor of Pathology, for the two men had met in Leipzig as early as 1876, when Welch was working in Ludwig's laboratory and Billings was making his European tour in the interests of the Hospital. The younger man made such an impression upon Billings at that first meeting that Billings later remarked to Mr. Francis T.

[10] Garrison, *loc. cit.*, pp. 207, 208.

King, the President of the Board of Trustees of the Hospital, who was with him on the trip, that when the time came to select the staff of the Hospital Dr. Welch was one of those whose services should be secured. It seems quite clear from this account by Billings himself that he was the first to propose that Dr. Welch should be appointed to the staff of the Hospital, and since he had kept in touch with Welch's work in New York after the latter's return to America, it is at least reasonable to suppose that he had a large share in Dr. Welch's appointment, a step which was destined to be of such great moment to the School of Medicine.

Billings also played an important part in the selection of other members of the original Medical Faculty. It had been decided, in 1884, to appoint a Professor of Materia Medica and Therapeutics, and Billings, who went to Europe that year as a delegate to the International Medical Congress, was commissioned to look into the matter of the available candidates for the post. His survey of the field and subsequent negotiations and reports led to the appointment of Dr. Matthew Hay, at that time a member of the Faculty of the University of Aberdeen, as Professor of Materia Medica and Therapeutics in the Johns Hopkins University. Dr. Hay accepted the appointment but was destined never to come to America, however, and later on resigned from the position.

When the time came to select the heads of the main clinical services of the Hospital, Billings again played an important part. Garrison gives him the credit for the choice of Osler as Physician-in-Chief to the Hospital, but it would appear that credit for that choice must be given more to Dr. Welch, for Billings seems to have had his eye at first on Lauder Brunton for the post, although he was eventually won over to the nomination of Osler.[11] Osler himself has described how Billings brought to him the invitation to come to Baltimore as Physician-in-Chief to the Hospital.[12] Dr. Halsted had to receive Billings' approval before he could be appointed to the staff of the Hospital, and has himself given us an account of his first meeting with Billings at a small dinner which Dr. Welch arranged,

[11] Cushing, Harvey. The Life of Sir Wm. Osler. Oxford, The Clarendon Press, 1925, p. 297.

[12] Osler, Sir W. British Medical Journal, 1913, 1, 641.

and how he quickly realized that the purpose of the meeting was to give Billings an opportunity to "look him over" with reference to his appointment as head of the surgical service of the Hospital.[13] Billings did not, apparently, have anything to do with the selection of Dr. Kelly as Gynecologist to the Hospital. It was Dr. Osler who was responsible for that selection.

The Trustees of the Hospital wanted Billings to be the Superintendent of the institution, but he declined the offer and his official connection with the Hospital ceased in the summer of 1889, when Dr. Hurd became the Superintendent. He still maintained his interest in the institution, however, and when it became apparent, in 1893, that the Medical School would at last open, he prepared for the benefit of the Medical Faculty a "Condensed Statement of the Requirements of the Principal University Medical Schools in Europe with Regard to Candidates for the Degree of Doctor of Medicine." This pamphlet was printed for private circulation and Dr. Welch has testified to its usefulness in organizing the instruction in the Medical School.[14] It probably represents Billings' last contribution to the organization of that School, in which he took such a great interest and to which he gave such valuable aid during its pre-natal period.

When the contributions which Billings made to the Johns Hopkins Hospital and the Johns Hopkins University School of Medicine are re-examined in the light of the half century or more which has passed since those contributions were made, one comes inevitably to the conclusion that both of these institutions were indeed most fortunate to have such a man as John Shaw Billings selected to plan the Hospital and to be the adviser of both the Hospital and the University authorities from the beginning. And one understands all the better why Dr. Welch, at the memorial meeting of the Johns Hopkins Historical Club held in May 1913, had this to say of him: "Of all the men I have ever known, he was about the wisest. He was a man whose judgment you sought on any difficult subject, and you pinned your faith to him more than to any man

[13] Johns Hopkins Hospital Bulletin, 1914, 25, 249.
[14] Johns Hopkins Hospital Bulletin, 1914, 25, 253.

of your acquaintance. He was wisest because he was under no illusions. He got at the heart and essence of things. He was an eminently sane man, who knew what it was best to do under the circumstances, and what it was practicable to do. This quality was associated with a wide vision and high ideals."[15] One could have no better character witness for John Shaw Billings than William Henry Welch.

[15] *Ibid.*, p. 252.

TWO PAPERS BY JOHN SHAW BILLINGS ON MEDICAL EDUCATION

WITH A FOREWORD BY

ALAN M. CHESNEY, M. D.
(From the Johns Hopkins University School of Medicine)

The following two papers by John Shaw Billings have been selected for reprinting in this issue of the Bulletin of the Institute of the History of Medicine, which commemorates the one-hundredth anniversary of the birth of their author, because they are interesting in themselves and because there is a real danger that they will be lost sight of in the future if attention is not especially called to them.

The first paper was published in the American Journal of the Medical Sciences in July 1878[1] and we are indebted to the Editor and to tne Publishers of that periodical for permission to reprint it in full. It bears only the initials of Billings in the way of a signature, and is not listed in the bibliography contained in Garrison's Memoir.[2] It is for the most part a review of contemporary medical education in Europe and presents observations on the situation in the United States as well.*

The second paper, as its title indicates, contains some of the material which Billings presented in a series of lectures on the History of Medicine, Medical Legislation and Medical Education before the Johns Hopkins University in the year 1877-78, when he was Lecturer in the History of Medicine in that institution. The lecture devoted to medical education was given on December 6th, 1877, and because of the interest which it aroused and the timeliness of the topic in so far as the University was concerned, the Trustees of that institution caused it to be printed in 1878 as a pamphlet for private circulation. The extent to which it was distributed at the time is not known and although it is mentioned in Garrison's Memoir it was

[1] Billings, J. S. Amer. Jour. Med. Sci., 1878, n. s. *76*, 174.

[2] Garrison, F. H. John Shaw Billings: A Memoir. New York and London. G. P. Putnam's Sons, 1915.

* I am indebted to Miss L. E. Lavarella of the Registrar's Office of the Johns Hopkins University for having brought this paper to my attention.

virtually lost sight of for a number of years and was only recently rediscovered in the archives of the University. Thus far only three copies of the pamphlet have come to light.

It may not be amiss to explain why Billings happened to be particularly interested in medical education at the time these papers were written. Two reasons can be assumed to account for this interest. In the first place he had been requested to prepare one of the articles in the series entitled "A Century of American Medicine" which was published in the Journal of the American Medical Sciences in 1876 in connection with the celebration of the Centennial of American independence.[8] To him was assigned the subject "Literature and Institutions," and in his article he gave a brief account of the development of medical education in the United States together with detailed information concerning some of the medical schools which were then in existence.

The second reason lay in the fact that he was one of five experts on hospital construction who were invited by the Trustees of the Johns Hopkins Hospital in 1875 to submit individual plans for the proposed hospital. Since the Founder himself had specified that the Hospital was to form a part of the Medical School of the University for which he had made provision, there was no doubt that the Johns Hopkins Hospital was to be a teaching hospital, and Billings never lost sight of that fact. He was necessarily obliged to take it into consideration in preparing his plan for the Hospital, and this necessity must surely have led him to speculate upon medical education in general and upon the nature and extent of the opportunity in that field which would be presented to the University when the Hospital would be ready to open. The results of his speculations in those directions, as embodied in the second of the two papers, should be of sufficient interest to students of the history of medical education in this country to justify the reprinting of that paper. It also deserves republication because it gives additional information concerning the mental processes of one of the great figures in American medicine. It is altogether fitting, therefore, that these two papers of Billings, which were in a fair way to be lost, should be rescued and made more available during this particular year which marks the one-hundredth anniversary of their author's birth.

[8] Billings, J. S. Amer. Jour. Med. Sci., 1876, 72, 439.

A REVIEW ON HIGHER MEDICAL EDUCATION

BY

JOHN SHAW BILLINGS

[From *The American Journal of the Medical Sciences*, Philadelphia, 1878, New Series, Vol. LXXVI, pp. 174-189.]

ART. XVIII.—*Higher Medical Education.*

1. *Practical Essays on Medical Education and the Medical Profession in the United States.* By DANIEL DRAKE, M. D., Cincinnati, 1832. 8vo.
2. *Lectures on Medical Education.* By SAMUEL CHEW, M. D., Philadelphia, 1864. 8vo.
3. *Contributions to the History of Medical Education and Medical Institutions in the United States of America,* 1776-1876. By N. S. DAVIS, A. M., M. D., Washington, 1877. 8vo.
4. *Higher Medical Education, the True Interest of the Public and the Profession. An Address Introductory to the* 112*th Course of Lectures in the Medical Department of the University of Pennsylvania.* By WILLIAM PEPPER, A. M., M. D. Philadelphia: J. B. Lippincott & Co., 1877. 8vo.
5. *De l'organisation des Facultés de Médecine en Allemagne.* Par le docteur JACCOUD, Paris, 1864. 8vo.
6. *Les hautes études pratiqués dans les Universités Allemandes.* Par ADOLPHE WURTZ, Paris, 1870. 4to.
7. *Etude sur l'organisation de la Médecine en France et à l'étranger.* Par LEON LE FORT, Paris, 1874. 8vo.
8. *Ueber das Lehren und Lernen die Medicinischen Wissenschaften an den Universitäten der Deutschen Nation.* Von Dr. TH. BILLROTH, Wien, 1876. 8vo.
9. *L'enseignement de la Médecine en Allemagne.* Par LOUIS FIAUX, Paris, 1877. 8vo.
10. *De la situation de l'enseignement Médical en France.* Par CHAUFFARD, Rev. des Deux Mondes, Jan. 1, 1878.
11. *Medical Politics; being the Essay to which was awarded the first Carmichael Prize,* 1873. By ISAAC ASHE, M. D. (etc.), Dublin, 1875. 8vo.
12. *Report of Proceedings of the Meeting of the General Medical Council in* 1877. Med. Times and Gaz., May and June, 1877.

It has been observed that the difficulty in forming an opinion on a subject is materially increased by studying it, and, as regards medical education, this statement is certainly correct. We have had occasion to examine with care the publications whose titles head this article, and have also, with somewhat less care, glanced over about a hundred other essays and addresses on the same subject, and the result is that we have no plan at present which can be recommended as a certain cure for the evils complained of. Having made this confession of ignorance, we now propose to set forth some of the plans of others who have been more fortunate.

No critical review of the works mentioned will be attempted; those who are interested in the subject are advised to read all of them; we shall give but a brief *résumé*, with an occasional comment or query.

There may have been a time when the physicians of some favoured country were entirely satisfied with each other's professional skill; but the records of that period have been lost. Hippocrates, Galen, Van Helmont, and Sydenham speak of contemporaneous physicians in much the same tone as that in which English, French, German, and American writers have been for fifty years, and are to-day, commenting on the results of their systems of medical education.

So long as this complaining does not pass the limits of what may be called grumbling, proceeding mainly from those who are out of the race, or who may be reasonably suspected of being misled by the idea that their own powers and qualifications have been overlooked, it may be allowed to pass without much notice: but when it becomes general; when in one particular country we hear it from students, teachers, and from private physicians generally; and when we find that the grumblers of other nations, always ready to disparage what they themselves possess, and to draw unfavourable contrasts between their systems and those of other countries, make an exception with regard to that particular country, we may infer that there is really something wrong in that case. Now this seems to be the condition of things with regard to medical education in the United States at the present time. Every one here seems dissatisfied; and abroad, while English writers are pointing out the superiority of the French or German systems, and French writers demanding less centrali-

zation on the English plan, we nowhere find the system of the United States held up as a model.

This may be considered as being, upon the whole, a good sign, since the first step towards improvement is the recognition of the evil to be done away with; but in the United States familiarity seems to have bred contempt in several senses. Of the causes for this state of things we need mention but a few.

The first is the character of medical students, and the motives which induce many to enter the profession. As Dr. Drake puts it:—

"A neighbouring physician wants a student to reside in his office, or one son of the family is thought too weakly to labour on the farm or in the workshop; he is indolent and averse to bodily exertion, or addicted to study, but too stupid for the bar, or too immoral for the pulpit; the parents wish to have one gentleman in the family, and a doctor is a gentleman; these and many other extraneous considerations not unfrequently decide the choice and swell the numbers, while they impair the character of the profession."

The principal motive for the study of medicine is not the love of science or of humanity; but, as Dr. Pepper points out, "a desire to earn an honest livelihood." It is a matter of business, and it is natural that the young, inexperienced, and usually poor aspirant should think that the less capital required to obtain the absolutely necessary stock in trade, the better for his purpose. Hence the tendency is towards the minimum qualification—the current sets in the direction of the easiest outlet.

The second cause is, that a thorough education is not as essential to success in the medical as in other professions, nor does its possession insure success in the same ratio. Physicians are not selected by the public with reference to their education; in fact, the public are not competent to judge, and the fashionable doctor is by no means always superior in knowledge. Medical students soon learn this, and are apt to conclude that thorough knowledge is not as desirable in a business point of view as it really is.

A third cause of trouble is, that too much is demanded of the average student, and he is forced to be superficial in his acquirements in self-defence.

The average student wishes to be a practitioner of medicine, to know a pneumonia, or a typhoid fever, or a dislocated shoulder when he sees it, and to know how physicians usually treat such cases. He does not intend to go into the wilderness, but to be near other physicians upon whom he can call in a doubtful case; he has no desire to be a medical expert or a sanitarian, or a specialist of any kind, nor yet to make discoveries or contribute to medical literature. He knows what he most needs for his purposes, *i. e.*, clinical and therapeutical instruction; he wants to see cases, and, as far as possible, the kind of cases he expects to treat. The anatomy which interests him is that of the arteries; for more than the broad general principles of physiology he cares little; he likes his therapeutics neatly packed in formulæ, and as for the languages and natural sciences, he sees very little use in their study. To such a man the majority of the demands for a higher and better medical education seem unreasonable; he does not aspire to a position which requires such an expenditure of time and money to fit one to fill it.

The majority of authors and essayists consider medical education solely as designed to fit men to exercise the art or handicraft of medicine, and therefore consider that as the best system which produces the best practitioners. Now it needs but little reflection to see that all medical practitioners cannot be alike skilful and accomplished. The doctor and the *officier de santé* of France represent two great classes of medical men; classes which must always exist, whether they be distinguished by title or not.

Professional skill, like all skilled labour, has a market value, and will be found where that value is given for it. Nor is the remuneration entirely a matter of money. The thoroughly educated physician requires an atmosphere of appreciation and encouragement, congenial society, and many other things which he will not find in thinly settled and comparatively poor districts.

These districts must, however, have physicians, and these physicians must be mainly routine-practitioners. In the education of such men the most important thing is the study of the disease on the living subject. They are almost all poor men, poor in time as well as money; they cannot have that sort of preliminary education contemplated by the requirement of the Baccalaureate Degree. This must

be taken into consideration in planning their curriculum. They will never learn chemistry, geology, physiology, and pathology, but they may learn how to treat fever, fractures, and wounds, how to tie an artery, to apply the obstetric forceps, and to use quinia, opium, and a dozen other drugs. There must be a minimum standard of knowledge fixed for them; and it must be fixed, not with reference to what a man who is to meddle with that complicated machine—the human body—should know, but with reference to the demands of society as measured by the value placed upon the services rendered.

We have said that all authors are dissatisfied with existing systems of medical education, and demand something higher and better, but they do not all use the same words in the same sense. American and English writers mean by higher medical education that the average education of the practitioner is to be raised, he is to study longer, and more branches, and to have a more severe examination. But French and German writers mean also by higher medical education that original research should be encouraged, that the science and art of medicine should be improved, that to the student should be imparted not only existing knowledge, but the desire and the power to add to it.

Assuming the superiority of the German Universities, Prof. Billroth thinks that it is due to the fact that they combine the functions of a school and of a learned society. It is the duty of the German professor not only to know the latest advances in science and to teach them, but also to become himself an investigator in, and an improver of, that branch which he is to teach. The result is that his teaching partakes of this spirit of inquiry, and his pupils, or at least the best of them, are trained in this spirit and method, and can often materially assist the teacher while improving themselves. That there are certain dangers in this he sees clearly enough. He points out that the government has the right to demand that the people shall be supplied with competent and trustworthy physicians, and as it is the business of the universities to produce these, they must not let the society predominate over the school in their method of work.

As far as the school functions only are concerned we have indicated some of the causes which are constantly, in all countries, tending to make the education and qualifications of the average physician lower than they should be. But as the character and skill of his

nearest physician may be at some time a matter of the gravest importance to any man, be he rich or poor, it is not surprising that attempts should be made to resist this tendency. Professor Le Fort remarks that—

"The theory which in all European nations has governed the organization of the medical profession is this: As the State is morally bound to protect the health and life of its citizens, and as these cannot know whether a certain individual has sufficient knowledge to practise medicine with safety to his patients, the State bestows certain titles upon, and marks, as it were, with the seal of its guarantee, those whom it presents to its citizens as worthy of their confidence. The United States of America alone forms an exception to this rule."

This same theory, as De Morgan points out, was once applied to the souls of the citizens as well as to their bodies, and it cannot be considered incontrovertible; but we will consider this hereafter. Let us now see how the theory is carried out in three or four of the principal European countries.

In Austria the diploma of Doctor of Medicine from any Austrian university gives to its holders the right to practise throughout the empire,—a privilege formerly held by the Vienna University alone. The preliminary examination of the student is in botany, zoology, and mineralogy, and the certificate of graduation from a gymnasium[1] or high school is also required. It is usually passed about two years after matriculation, but may be passed at any time of the first four weeks of any semester. The examination for the degree of Doctor of Medicine is divided into three parts, known as the three *rigorosa*.

To be admitted to the first *rigorosum* the requirements are, certificates of birth, baptism, and gymnasial graduation, of two years' attendance at the university, with at least ten lectures per week, of having dissected for one year, and of having passed the preliminary examination. For the second and third *rigorosa* there are required, certificates of faculty attendance for five years, of two years' attend-

[1] The course of study at the gymnasium occupies eight years, and includes Latin, Greek, German, geography, history, botany, zoology, mineralogy, logic, and psychology. In addition to these, the following are taught, but their study is not obligatory, viz.: modern languages, drawing, singing, and stenography.

ance on medical and surgical clinics, of one-half year's clinical study of obstetrics and ophthalmology, and of having passed the first *rigorosum*.

The peculiarities of the medical institutions of Germany are largely due to the fact that, in the latter part of the seventeenth century, the government established a network of medical officials over the country, and organized its own boards of examination for those who desired to become practising physicians, which boards were independent of the universities.[1] This system was intended to secure the best medical talent for the service of the government, but the result was not very satisfactory, and it was found difficult to obtain a sufficient supply of skilled medical men for the military service; and in Austria, Saxony, Prussia, and Russia, schools were established at the end of the eighteenth century for the purpose of educating army surgeons.

In the formation of these German military medical schools, as well as the similar establishment at St. Petersburgh, the first idea of the government seems to have been that the civil schools were deficient either in number or capacity. Moreover, they seem to have thought that they could retain physicians after they had got them educated.

Neither of these theories was correct, for the foundation of the difficulty lay in the fact that the position of the army surgeon on duty with a regiment was an inferior one, and distasteful to educated gentlemen. The army officer looked down with quiet contempt and condescension on men who were non-combatants, and knew nothing of military tactics, and, as these positions of medical officers had for a long time been filled by men of the lowest class, it had been found possible to treat them as servants and appendages. Even at the present day, so persistent are traditions and customs in military matters, the majority of men trained in a military academy, when they come to realize the sweets of command, find it difficult to realize that a thoroughly trained physician is their equal, though, in fact, in general education, he is often their superior.

No government has as yet fully comprehended the fact that a

[1] For a good account of this organization consult a series of articles by Dr. Bushman, in the *London Medical Times*, 1849, vols. xix., xx.

fully educated army surgeon—such a one as it would be satisfied to intrust with the care of its troops and officers—can only be obtained and retained by giving him both sufficient pay and social position; and it will probably be a long time yet before the commonplace axiom, that to secure a regular supply of any first-rate article you must at least give the market price, will be accepted as applying to medical officers of the army or navy.

Under the laws relating to State examinations and the central medical board, as no one could practise who had not passed the State examination, it was found necessary to provide for the wants of the poorer districts by authorizing an inferior grade of practitioners, who were examined mainly in surgery and obstetrics, and who corresponded in most respects to the *officier de santé* of France. Since the consolidation of the empire all this has been changed. At the present time any one can practise medicine in Germany without a diploma and without an examination, and the inferior legal class of practitioners is done away with. But no one may call himself, or allow himself to be called, physician (*Arzt*) unless he has passed the State examination, nor doctor unless he has obtained that title by the University examination, and these two titles are sharply separated. The doctor is not a physician (*Arzt*) unless he has passed the State board, and the *Arzt* is not a doctor unless he has passed the faculty board. The man who is neither *Arzt* nor doctor practises at his peril, for though he is not forbidden to do so, yet, if any mishap occurs from his ignorance, he is punished not only by fine, but by imprisonment for a period varying from six months to ten years.

The expenses of passing the State board are less than half those for the faculty, and the examination is more exclusively practical; hence it is selected by the poorer students who seek only a rural practice.

The majority of students pass both examinations, and this is especially necessary for those who aspire to any medical office.

The preliminary examination is known as the *tentamen physicum*, and the same preliminary certificates are required as in Austria. It includes anatomy, physiology, chemistry, physics, botany, zoölogy, and mineralogy, and is usually passed at the end of the second year of university life. The State examination is divided into four parts,

corresponding in all essential points to the Austrian *rigorosa*. In the examination in practical medicine and surgery, the candidate has to treat two or three cases in each branch for about a week, and to present a written account of these cases. In the Austrian universities a thesis for graduation is no longer required, but it is still demanded in Germany, though not always printed.

The number and character of professorial chairs in the medical faculties vary greatly in the different universities, but in all we find three classes of teachers, viz.: professors, extraordinary or assistant professors, and privat docents.

Thus, at Berlin, there are 14 professors, 14 assistants, and 37 privat docents, with about 260 students; Kiel, the smallest university, with 55 students, has 7 professors and 7 privat docents; while Vienna, the largest, with 860 students, has 19 professors, 38 assistants, and about 70 privat docents.

The professors are appointed for life, and at the end of thirty years' service can retire on a pension; they receive a fixed salary from the State or University—a part of the revenue derived by the medical faculty from certain fees, and their lecture fees from the students. The fixed salary is occasionally increased according to the success and reputation of the professor, and the total salary varies from 2000 to 7500 dollars. Any doctor in medicine may be a candidate for a vacant chair, the selection being made by the minister of public instruction from a list of names recommended by the faculty.

The extraordinary or assistant professors are appointed in like manner from among the privat docents. As a rule, their compensation comes only from students' fees, but occasionally a small fixed salary of about 650 dollars is allowed.

The position of privat docent is accessible to all doctors of medicine, and the number is unlimited. Their compensation is from students' fees, and they may not underbid the regular professor. At some universities they are furnished with rooms, and given a share of the clinics; at others, they receive little or no assistance.

There are no independent medical schools in Germany. No one can open a course on his own responsibility, and the universities alone have the power to confer academic grades. The system of privat docents, however, compensates in a great measure for this

want of freedom. As the test of fitness for a degree in the university, or for the position of practitioner in the State, is, mainly, the ability to pass certain examinations, and as the salaries of the professors are guaranteed by the State, it is evident that it makes little difference as to precisely when, where, or how the student gets his information, provided only that he really gets it.

There is, therefore, little objection to free, or, as it is sometimes called, " extra-mural teaching," and hence young men of ability can establish themselves as private teachers, demonstrators, etc., in the immediate vicinity of the universities, relying on their own talents and tact to secure pupils. These are the privat docents, much of whose teaching consists in giving short courses, of from six to eight weeks' duration, on special subjects. These privat docents are subject to certain regulations, and follow in a general way the teaching and directions of the professor of the special branch to which they attach themselves; they are understood to be in training for professorships, and, if they show marked ability as teachers or as investigators, their promotion may be very rapid.

When a professorship becomes vacant in a German university, it may occasion several changes, especially if the position be an important one, because there immediately follows an effort to induce the best man from some other university to come and fill the vacant place, and, if this be successful, then there is another empty chair to fill, and so on. Of course, counter-inducements are held out by the universities which wish to retain their famous men, and thus a sort of auction follows, in which sometimes the article sold, viz., the professor, can almost dictate his own terms. When we use the words " auction " and " sold," we do not by any means intend to imply that it is purely a matter of money. Social position, orders of nobility, handsome residences, or special facilities for scientific pursuits, are some of the various inducements that may be used.

For instance, after the transfer of Strasburg to Germany, neither pains nor money was spared to make the University a success. For the chairs of the medical faculty rising men were selected, all of whom were known for original research and had practically proved their ability as teachers and writers. The chair of pathological anatomy was given to Recklinghausen, one of the most brilliant of Virchow's pupils. When the chair of pathological anatomy at Vienna

became vacant by the retirement of Rokitansky, it was offered to Recklinghausen, and the salary proposed was 25,000 francs, or about three times the usual salary of such a professorship. But the Prussian government was quite as anxious to retain Professor Recklinghausen as the Austrian government was to obtain him, and asked him to say what he wanted. His reply was to demand, as the condition on which he would remain, that there should be constructed a large pathological institute, in accordance with his plans, and in connection with the hospital,—an institute which will cost several hundred thousand dollars, and will require a change in the fortifications. His demand was acceded to, and he is hard at work now in Strasburg.

In this way the smaller universities become training schools for the professors of the larger and wealthier ones, and thus the most powerful stimulus possible is constantly acting on all teachers throughout the two empires.

For instance, the medical faculty of the University of Kiel is in an out-of-the-way place; its average number of students present is about 50, and it has a clinic of about 200 patients in hospital. Yet in this small establishment began to teach Stromeyer, Langenbeck, Frerichs, Cohnheim, and Esmarch. The latter, in fact, is still there, notwithstanding offers which have been made to him from other universities.

Let us now turn to the manner in which these things are managed in France.

In France there are two grades of physicians: the *officier de santé*, or rural practitioner, and the doctor of medicine. For a very full and able discussion of the merits of a system of two grades of practitioners we would refer to a little book containing the debates in the French Legislative Assembly, in the spring of 1847, upon the subject of medical organization in France.[1] At that time the first general medical congress of French physicians was held in Paris, and a new journal, the *Union Médicale*, which still flourishes, had just appeared as the organ of French medical opinion as expressed in the congress. The main points in dispute were, first, whether there should be more than one grade of practitioners, with corre-

[1] De l'enseignement et de l'exercise de la médecine, * * par M. Victor Cousin. Paris, 1850. 12mo.

sponding differences in the methods of education; second, whether appointments to the professional chairs should be by *concours*.

M. Cousin insisted, in opposition to the opinion of the majority of the physicians, that two grades of medical men were necessary, the *officiers de santé* for the requirements of the people in thinly settled and rural districts, and the superior grade for the sake of medical science. He also held that, while the *concours* was a proper means of selecting the *agrégés*, or assistants, it was not the best way of obtaining professors, and his position in both these questions seems to us to have been correct.

It is by no means easy, from the literature of the subject, to appreciate the existing condition of medical institutions in France, or to learn the causes of this condition.

As her schools have fallen in repute, less and less attention has been given to them by foreign writers, while those French physicians who are really well acquainted with the subject are disposed to be reticent from motives of pride or policy, so that their views must be obtained rather by inference from the points which they specially approve in other countries, and from their cautious recommendations for legislation, than from any direct and positive statements.

It is clear, however, that the hand of a paternal government has been lying heavy upon medical education, and that centralization has been carried to an extreme.

The organization of the great central medical faculty at Paris and its requirements for graduation are probably well known to all our readers, as there has been little change in them for many years. Quite recently, however, a number of reforms and improvements have been projected, which are explained in the article of Prof. Chauffard. The most important of these is the providing of new buildings for the faculty and for clinical instruction, for which purpose the sum of four millions of francs has been granted, one-half coming from the state, the rest from the city.

Heretofore the presentation of the degree of bachelor of science has not been required until the middle of the first year of the medical student's course. The result has been that too much of the first year has been occupied with the studies pertaining to this degree, and, as the four years' course required is too short already, it has been

decided that the degree of bachelor of science, as well as of arts, shall be required at the commencement of the medical course.

In July, 1875, a law relating to medical education was passed by the National Assembly of France, in which it is declared that a school of medicine may be established in any city which will pay a proper share of the expenses.

In such a school there must be 17 professors, allotted to the following chairs, viz.: Anatomy, Physiology, Internal Pathology, General Pathology and Pathological Anatomy, Hygiene and Legal Medicine, Operative Surgery, Therapeutics, Materia Medica, Botany and Zoology, Medical Chemistry, Medical Physics, Pharmacy, and Clinical Obstetrics, each one; Clinical Medicine and Clinical Surgery, each two.

The salary of each of these professors is 4000 francs, with 1000 more for the director.

There must be eight assistant professors, two of whom are assigned to the natural sciences, two to medicine, two to surgery, one to obstetrics, and one to anatomy and physiology. These assistants are to be selected by *concours* and appointed for ten years; their salary is to be 2000 francs, and they must give three lectures per week. The law then goes into the details of assistants, down to the porters and messengers, specifying their duties and salaries.

Everything is fixed; it is not supposed that the faculty which is to do the work, or the municipality which is to bear the expense, can be trusted to decide even as to the scrubbers, or how much they should be paid.

The city must undertake to meet all the expenses for salaries, fuel, lights, repairs, and books and material. It must also provide two amphitheatres for lectures, an office for the director, a room for the secretary, and buildings including three chemical laboratories, two laboratories for physics, one for pharmacy, one for physiology, etc.

The faculty must have at its disposal in a hospital, founded by itself or furnished to it by the government, at least 120 beds habitually occupied for clinical teaching; there must be two clinical amphitheatres, and each clinical teacher must have a small working-room or laboratory. In short, the details are given so minutely that it is legitimate to infer that as water-closets are not mentioned they are not considered desirable.

The pupils of the free faculty may be examined for degrees by the state faculty on proving that they have followed the prescribed course, or they may be examined by a special board. In 1876 it was enacted that all examinations must be undergone in the state faculties, which is, of course, a very serious limitation to freedom of teaching.—(*Gaz. Hebd.*, 1876, p. 368.)

It is fair to infer that this legislation was intended to prevent any but a large and wealthy municipality from forming a medical school, and to give the name rather than the substance of liberty to teach.

Under the new law the city of Lyons made a formal request of the state for the creation of a faculty of medicine at that place, promising on its part to put up buildings which should cost 5,000,000 francs, and to pay all the excess of expenditures over receipts to the amount of 300,000 francs per year. With regard to the organization of the faculty, a suggestive and valuable report was made to the municipal council by Dr. Gailleton, the conclusions of which were adopted and recommended to the Minister of the Interior. After urging that there should be no chairs of the accessory or natural sciences in the medical faculty, and that chemistry, physics, and natural history should belong to the faculty of sciences, he says:—

"We would suppress, also, the chairs in which the professors declaim with more or less eloquence on the principles of medicine and surgery. On these subjects a good book is of more use to the subject than a lecture. This teaching is better effected by conferences, and should be reserved for the assistants or free professors. The clinics should be increased, and should include diseases of the eye, of the skin, syphilis, mental diseases, diseases of children, diseases of the larynx, diseases of the ear, and of the urinary organs." (*Lyon Médical*, Nov. 1876, p. 333.)

It was also recommended that any doctor should be allowed to open a course or to teach on any medical subject, and the student should have the right to choose his professor. The uniformity of salary for the professor is objected to. This salary has been fixed by the ministry for all the professors at 6800 francs per year.

"We consider this uniformity of salary as absolutely incompatible with the prosperity of a provincial medical school. The professors must be divided into two classes: the first, devoted to pure science

and to laboratory researches, should not be diverted from their work by other occupations; the second, by the nature of their teaching, receive money from practice. The professors of anatomy, of physiology, of pathological anatomy, and of experimental and comparative medicine ought to live in their laboratories, in constant contact with their pupils. The actual direction of the work of the pupils will take all their time."

It is proposed, therefore, that these professors shall have 5000 francs extra per year. It is also strongly insisted on that in each laboratory there must be an assistant, competent and well paid, and that these are as important as the professors.[1]

The result of the consultations is shown by the decrees of April 22d and 24th, 1877.[2]

The composition of the combined faculty of medicine and pharmacy of Lyons is as follows:—

1st. (25 chairs): Anatomy, 1; Physiology, 1; General Anatomy and Histology, 1; Pathological Anatomy, 1; Comparative and Experimental Medicine, 1; Medical and Pharmaceutical Chemistry, 1; Medical Physics, 1; Natural History, 1; Pharmacy, 1; Internal Pathology (Medical), 1; External Pathology (Surgical), 1; General Pathology and Therapeutics, 1; Hygiene, 1; Therapeutics, 1; Materia Medica, 1; Jurisprudence and Toxicology, 1; Operative Surgery, 1; Clinical Medicine, 1; Clinical Surgery, 1; Clinical Obstetrics, 1; Clinical Ophthalmology, 1; Skin Diseases and Syphilis, 1; Mental Diseases, 1.

2d. Two supplementary clinical courses: Diseases of Women, 1; Diseases of Children, 1.

The number of assistant professors (*agrégés*) is to be 22. Three of these are assigned to clinical medicine, one to jurisprudence, one to therapeutics, two to mental disease, six to clinical surgery and obstetrics, one to anatomy, one to pharmacy, etc.

One-half, designated by lot, serve for three years, the other half for six years. The appointments are to be by *concours*.

The medical faculty of Paris consists of 29 professors, and about 30 *agrégés*, or assistant professors. As fixed by decree of Jan. 14th,

[1] See Lyon Médical, 19 Nov. 1876, xxxiii., p. 440.
[2] Union Méd., April 28, 1877, p. 705.

1876, the salary of a professor is fixed at 13,000 francs, and that of the *agrégé* at 4000 francs. The number of students is about 6000, and the annual number of graduates about 500. The Paris school has, therefore, a larger number of medical students than all the German universities together, but its students are nearly all French, while to the Austrian and German schools they come from all parts of the world.

The systems of medical education and of medical polity in all the countries of Europe, with one exception, correspond to either that of France or that of Germany. The exception is Great Britain, and the peculiarity here is that there are no State medical schools. The schools are private corporations, and the examining and degree-granting powers are also private, though distinct corporations.

All that the government undertakes is to publish an authentic list of qualified practitioners, and to define the minimum of qualification which shall entitle a physician to be recorded on this list.

This is done through the agency of a body known as the General Medical Council, which may be considered as a sort of medical representative body of the larger medical corporations. The reports of the last meeting of this council, published in the *Lancet*, *Medical Times and Gazette*, and *British Medical Journal* for May and June, 1877, will be found to give a very good idea of the existing condition of medical education in Great Britain; and, as far as the formation of practitioners is concerned, the results may be said to be fairly satisfactory. The principal complaint made is that of defective preliminary education in the candidates, and that the time for medical studies (four years) is too short. The professors' fees are derived entirely from the students.

We can now, perhaps, appreciate the difference between the French, German, and English systems of medical polity and of medical education, which are in many respects well marked. In France, the State undertakes to play the principal part; the schools are State schools, physicians are State officials. Substantially, thus far, the effect of the State control has been to centralize instruction in the Paris school. The recent law with regard to the formation of free faculties has as yet had little effect; and in fact there is little freedom possible so long as the State on the one hand fixes the courses of instruction and the requirements for graduation, and on

the other hand bestows such pecuniary aid on its own favoured institutions that it is almost impossible for any school not thus assisted to compete successfully with them. In Germany the connection between State and school is less direct, the attitude of the State being that of protection and encouragement rather than of immediate direction; nevertheless the schools are essentially State institutions, and cannot go far out of a certain course without being "protected and encouraged" back into it. The marked difference between France and Germany is the number of schools all nearly on an equality, and the healthy competition and friendly rivalry which are thus insured. The German universities are great corporations, with special powers of jurisdiction over their inmates, and it is considered a special honor and privilege to come under this peculiar jurisdiction. The French school has no such privileges.

In Great Britain the State has but little to do with the matter. The schools themselves, through their representatives in the council, regulate all matters of education, and there is practically no law against irregular practitioners or quacks. All that the State undertakes is to see that the schools, through their council, shall furnish to the public an authoritative list of qualified practitioners.

In a few of the older universities certain professors are appointed by the Crown, but by far the greater number are selected by the schools themselves. The fees of the professors are not guaranteed or regulated by the State, and there is no retiring of professors on a pension.

The condition of medical education in this country may be briefly summed up as follows:—

There are now 65 medical schools in the United States, besides those devoted to homœopathy, eclectic and botanic systems, etc. During the winter of 1876-7, these 65 schools had 7141 students, of whom 2313 graduated as doctors of medicine in the spring of 1877. There were employed in these schools 515 professors, and 279 other teachers with various titles.

In five of these schools there is a graded course of three years, and in two a preliminary examination is required, although of a low grade. Of the remaining schools about 15 are doing fairly good work, work as good as there is a demand for, and are prepared to improve as rapidly as public opinion and financial necessities will permit.

The rest of the schools are doing poor work, and will probably continue to do it. Many of them owe their existence to the desire of two or three gentlemen to advertise themselves without coming under the ban of the Code of Ethics. What an individual may not do is yet permissible to a corporation. The profit from such schools does not come from the fees of the students, but from the advertisement, and from the consultation cases which the graduates bring to the professors. They can well afford, therefore, to accept low tuition fees, or even to teach without fees. It is useless to discuss methods of improvement for this class of schools; the only useful reform is one that will put an end to their existence.

The amount of general education and time of study required by our medical schools are about the same as, or perhaps a little less than, those required for veterinary medicine abroad.

It is assumed that students coming up for their first course have been reading with a private preceptor for about one year.

"But those subjects which should be studied first are precisely those which require demonstration by means which are not at the command of private teachers, and especially of those in the rural districts. The result is that the medical student, instead of studying chiefly anatomy, chemistry, and physiology, does his reading on these subjects in a mechanical, listless way, and gives his real attention to works on practical medicine and surgery, because he has some cases shown him almost every day."

This "American system," as it is called, although it is only entitled to this name because it has been retained in America after the rest of the world had dropped it, is really one of the great causes of difficulty in the way of putting our systems of medical education on a satisfactory footing. The day of apprenticeships and private pupilage has passed for all students who know their own true interests, since the time which they thus spend is for the most part wasted, being taken from the time which should be given to laboratories, hospitals, and lectures. Many members of the medical profession, however, are, and will be, reluctant to give up this business of preceptorship. "It adds a little to their income, and more to their importance; it makes them professors in a small way, puts some patronage into their hands, gives them an office boy or two,

and need be no trouble unless they choose, and in most cases they do not choose."

All attempts to compare the practical skill of, or the results obtained by, the physicians of the United States with those of other countries are worse than useless, nor in fact is it probable that the methods of treatment differ much, for, thanks to medical journalism, the art is now cosmopolitan, and a new remedy reported from England or Germany will very speedily be tried here. As far as surgery, and especially what may be called mechanical surgery, is concerned, the comparison is certainly favourable to this country. When, however, we come to compare our medical literature with that of other countries, the result is not gratifying to our national pride; and, after all, it is by this that we must be judged. A "doctor" should be a teacher as well as a practitioner, and his duties do not end with the cure or death of his patient. He ought, for the sake of the profession and the public, to set forth the how and the why of his results.

Defective education shows its effects in omissions as well as commissions, and in this respect we can only plead guilty. The various attempts which our physicians have made to produce a change for the better have not as yet produced any striking results, but the attention of the non-medical public, which is after all the party most immediately interested, and is probably the only source from which effectual reform can be expected, has been to some extent aroused, so that it is probable that in the course of time our legislators will provide some means by which the public can distinguish the properly trained physician. It is very evident that our young men must be much more studious and intelligent than those of France, Germany, Sweden, or Great Britain, or else that they must be less well informed on graduation, since but two years of study are required here for that purpose. It is also clear that the course of reform in our medical education has been something like that of reform in the civil service. Every one agrees that it is a most desirable thing, but the majority is opposed to any particular mode of effecting it.

The causes of the dissatisfaction which exists are easily understood; they are even on the level of the understanding of the western Bunsby, who argued, loud and long, that the horse could

never trot a mile in two minutes, "because the distance was too great for the time."

The defects in the American system of medical education are summed up by Dr. Pepper as follows:—

"1st, the absence of a preliminary examination; 2d, the very short term of studies required; 3d, the want of personal training in the practical branches; 4th, the absence of any grading of the curriculum; 5th, the examination of the candidates for the degree by those having a direct pecuniary interest in their success."

The evil result of these defects upon which he lays most stress is the over-production of medical men. He estimates that in the United States the proportion of physicians to population is 1 to 600, while in Austria it is 1 to 2500, in France 1 to 1814, in the German Empire 1 to 3000, in Great Britain 1 to 1672, and in Sweden 1 to 7500. These estimates are based on special official reports obtained through the State Department, and the summary of these reports, given in an appendix to the address, forms a very valuable contribution to the statistics of this subject.

Intimately connected with the excessive production of improperly educated medical men is the prevalence of quackery and the sale of fraudulent diplomas, and also the abuse of medical charities by establishing free dispensaries to furnish clinical material for the medical schools.

It will be found interesting to compare with Dr. Pepper's address the Carmichael prize essay for 1873, by Dr. Ashe. The Carmichael prize essays are the result of a bequest of £3000 to the College of Surgeons of Ireland, the interest from which is to be awarded every four years to the best essay upon the state of the medical profession in Great Britain and Ireland, on the state of the hospitals and schools of medicine, and on the state and mode of examination or testing the qualifications of candidates of the different licensing colleges or corporations in medicine, surgery, and pharmacy.

Dr. Ashe finds that in Ireland there are at least 24 per cent. more physicians than are needed, and that to this supernumerary 24 per cent., "it is due that the public can treat us as they please, can pay us fees or not as they choose, can send for us any distance, or require from us any length of attendance, and then pay us at their

own tariff." The poor law medical officers attend districts varying from fifty to one hundred and fifty square miles in extent, at salaries varying from *7s.* to *2s. 9d.* per day, and "so indiscriminate is the character of the poor law medical relief that practice is almost abolished, as every one can obtain a ticket if he only asks for it."

"Yet, when one of these appointments falls vacant, what happens? A rush is made from all quarters, as if to a newly discovered Australian gold reef. In the hope of making something by the sale of medicines in an unoccupied district, men, mostly young men, flock in from towns like those we have spoken of above, where there are two or three doctors per 1000 inhabitants. Active canvassing goes on, for is not *4s. 6d.* a day with a shop better than the shop without the *4s. 6d.*, even though severe labour has to be incurred, and the expense of a horse and man has to come out of the *4s. 6d.*? Of course the committee conclude, that, as there are so many applicants, they have offered ample remuneration. If an increase of salary is afterwards asked for by the successful candidate, they oppose it, on the grounds that they can get plenty of eager applicants at the same salary, so the doctor can go if he is dissatisfied."

The remedy proposed by Dr. Ashe is to increase the severity of the preliminary examinations, so that about one-third of those now passing shall be excluded. He frankly avows that this limiting of numbers is trades-unionism, pure and simple, but contends that it is trades-unionism only in its legitimate feature, in order to place physicians before the public in the position of parties to a contract for their services, instead of suppliants for employment at any time.

Let us turn now to the remedies proposed for the condition of things in the United States. As far as protection to the public from incompetent practitioners is concerned, the majority of the medical profession are probably of the opinion that the government should interfere in some way, but in what way is by no means generally agreed upon. It is clear that it is a matter that is under the jurisdiction of the several States, and that Congress can do nothing directly. All that the General Government can do is to encourage a high standard of education in its medical officials, and to provide facilities for medical teachers and writers in the shape of a national medical library and museum. It would also be possible for it to publish an official medical register, in which the degrees obtained

by each physician should be noted; but this would be of little use, because the degrees under existing circumstances are of little value.

Dr. Pepper thinks that each State should prescribe the number of years to be devoted to medical studies before graduation, and should create a State board of examiners, who alone should have the right to confer licenses to practise within the limits of the State. This would probably be an effectual remedy, provided that public sentiment would permit the infliction of penalties upon those who practised in violation of the law. Such a public sentiment does not exist at the present time, and we do not believe that it will exist for a long time to come. Compulsory and official registration of practitioners seems much more practicable, and we should be glad to see this experiment fairly tried. As a commencement, and for the purpose of obtaining information, we should be glad if the next census could register them all, good and bad, somewhat after the plan proposed by De Morgan.

"Let the Register give the name, address, and asserted qualification of each. . . . . Let it be competent to any man to describe himself as qualified by study without a diploma, ... or even by intuition or divine inspiration if he please. Let all qualification which of its own nature admits of proof be proved, as by the diploma or certificate, etc., leaving things which cannot be proved, as asserted private study, intuition, inspiration, etc., to work their own way.

"Let it be highly penal to assert to the patient any qualification which is not in the Register." (De Morgan, A. A., Budget of Paradoxes, London, 1872, 8vo., p. 160.)

In addition to this, De Morgan proposed to make it a penal offence to practise if unregistered.

His suggestion was given half in jest and half in earnest, and it is plain that the value of an annual official Register of Physicians, such as is now issued in Great Britain, would be destroyed to a great extent were every claimant included; but for statistical purposes, and to give some positive data for legislative action, it seems worthy of consideration.

In view of the defects complained of, how does it happen that the great majority of our practitioners are fairly skilled in their art, and that the results of their treatment will compare favourably with those of foreign physicians? We suppose it is because the majority

of them gain the most valuable part of their skill at the expense of their first patients. How else can they get it, at least as regards internal therapeutics? As far as mechanical surgery and those specialties which depend mainly on mechanical appliances are concerned, it is easy to see why preliminary education and general culture are of minor importance. It should also be remembered that a very considerable proportion of the medical profession in this country have not limited the time of their studies to the usual two years' curriculum. Many of them have studied three years, a goodly number have added a fourth year in hospital service, and over one per cent. have studied in foreign schools. If a man wants a really skilful practitioner there are few localities in the United States where he cannot be found or brought without much trouble. Let it not be supposed that we consider the condition of things satisfactory. Far from it, but we are just now considering the question of the supply of practitioners for the people, and it seems to be not so bad after all, being nearly as good as there is a demand for, which, according to political economists, is the main point, and it is from this point of view that the public and its representatives, the legislators, must view it.

From the point of view of the well-educated physician the case is different. Small wonder that he should feel discontented when he sees the sort of men with whom he is classed by the public. His only hope for improvement, however, must be in the education of this public. As far as the better class of schools are concerned, it is difficult for them to effect improvement, but it is by no means impossible. The experience of Harvard and of the University of Pennsylvania shows that extending the course of study to three years will be a financial success. Far more important, however, than lengthening the curriculum, is the establishing a satisfactory preliminary examination. It is at the very beginning that incompetent men should be rejected, and this for their own sake.

No such examination has yet been tried in this country, nor can it probably be maintained by an institution which is not so endowed as to be comparatively independent of the students' fees. These fees in fact are but a small proportion of the cost of properly educating a medical man, which is about two thousand dollars. Billroth estimates the cost to a university of a course of five years, such as he

recommends, as being about $2500 for each student, and his chapter on this subject will be found especially interesting.

Thus far we have been considering the subject of medical education from the point of view from which the majority of authors and essayists view it, namely, as designed to produce medical practitioners,—as fitting men for the art or handicraft of medicine. This is the article for which the demand is evident, and the supply corresponds. We have plenty of *officiers de santé* in this country, too many, in fact; but it is not so clear that we have too many doctors, using that title in its proper sense.

What is the prospect in this country for the production of men qualified to teach medicine and the cognate sciences, and to carry on original research? We think it probable that this also we may hope to see accomplished. A new university is just now taking shape in Baltimore which has, to a great extent, the means to undertake this special work, and the authorities of which are now considering this problem of medical education with reference to the mode in which they should organize their medical department. Let us hope that their decision will be a wise one, and that a sufficient number of young men may be found in this country to appreciate the opportunity which will thus be afforded them.

At the present time the duty of those physicians who wish to see our present system of medical education improved is plain. They should exert their influence in favour of those schools which have adopted the three years' course, which have good laboratory and clinical facilities, and which exact the greatest amount of preliminary education in their students. They should advise their young friends and pupils to go to these schools, and to avoid others, and show them that it is to their own interest to do this.

As to legislative restrictions on the practice of medicine, we doubt the policy of urging them by members of the profession. Any law which accepts a diploma as evidence of competency is especially objectionable, for it offers a premium to schools of a low grade. This objection applies also to registration laws, but in a less degree. The special value of registration is that it will furnish some positive data, and thus enable those who are really and practically interested in the subject to see precisely what is the extent of the evil which they propose to combat.

J. S. B.

MEDICAL EDUCATION.

EXTRACTS FROM LECTURES

DELIVERED BEFORE THE

JOHNS HOPKINS UNIVERSITY,

BALTIMORE,

1877–8.

By JOHN S. BILLINGS, M. D.
Surgeon United States Army.

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NOTE.

During the Autumn of 1877, a course of twenty lectures was delivered on the History of Medicine, Medical Legislation and Medical Education, by Dr. J. S. BILLINGS, U. S. A., of Washington, before the Johns Hopkins University. In the hope that the suggestions thus presented would be of permanent value to those who are engaged in the formation of plans for the medical courses in the Johns Hopkins University, and also to others, elsewhere, who are interested in the advancement of medical science and education, the Trustees have requested the leave of Dr. BILLINGS to publish the following pages.

SUGGESTIONS ON MEDICAL EDUCATION

FROM A COURSE OF LECTURES BY

DR. JOHN S. BILLINGS, U. S. A.

In view of the present condition of Medical Education in this country, how should the Johns Hopkins University organize its Medical Department?

The course to be taken must be not only theoretically desirable, but practically possible, and in selecting it, the true interests of Medicine and of the Public are to be consulted, since they are the true interests of the University, putting aside pecuniary considerations. Another general principle which should be kept in view is, that in giving, an effort should be made to give not only that which is useful, but that which is least likely to be furnished from other quarters. Coals should not be carried to Newcastle as a gift any more than as a commercial speculation. In this eminently practical and money-making country, we should expect to find the schools organized with reference to the immediate pecuniary interests of pupils and teachers, and it has been shown that they are so organized. The demand made on this Institution is for something else; not a single person has advised the establishment of a school on the same plan as those already in existence. This is not saying, however, that the same purpose is not recommended, and in fact, nearly all the writers and speakers on Medical Reform, and those with whose advice I have been favored—ask that it shall make practitioners, better trained and more skilful than those of other schools, but still practitioners.

This is the object of the new course at Harvard, and at the Universities of Michigan and Pennsylvania, whose success in attaining it is not doubtful, and their example is certain to be followed by the other large Metropolitan schools as fast as they can obtain moderate endowments, for the very simple reason that it will pay. This is also the object of the French and English Schools, and I have given an account of the various methods proposed by them to supply the special needs of a young man who proposes to become a skilled practitioner.

Given a student with a fair preliminary education such as is required in all Continental Schools, what is his great and urgent need? From all sides comes the answer "Clinical Instruction," the study of disease on the living subject. The sooner he can begin to profitably receive instruction by the bedside of the sick, or rather to instruct himself there, the better. Nothing can take the place of this; if it be not obtained before graduation, when errors can be prevented by the teacher, it must be obtained afterward at the expense of the first patients who present themselves.

To fit a man to meet the emergencies of general practice, this clinical experience must be wide and various, he must see many cases, and as many different forms of disease and injury as possible. It may be ten years after he begins practice, before he will see a case of strangulated hernia, or puerperal convulsions, or of labor with deformed pelvis, but when he is called to such cases, often in the night, at a moment's warning, nothing else can give him the skill and confidence, and power to help, which will be afforded by the memory of a similar case which he has seen properly treated.

An absolute necessity then to make the school effective in training practitioners, is abundance of clinical material—large dispensaries and hospitals in which men, women, and children, affected with all sorts of diseases and injuries are brought together.

So far as the Hospital is concerned, it must either have a large number of beds, or some means of moving patients rapidly through its wards, discharging them to institutions for chronic or convalescent cases, and filling their places with those of immediate interest. Even in the very large hospitals of Europe, it is sometimes difficult to provide that variety of cases requisite for teaching purposes, and where clinical teaching is almost the exclusive means of instruction, as for instance, at Vienna, the Professor has to establish very remote connections occasionally.

There will be a Hospital connected with this University, a Hospital which, I hope, will in its arrangements for the good of its patients, and of the school, be as complete as it can be made, but this Hospital cannot furnish clinical facilities for a great number of students, because it will not be large enough, and for other reasons which need not be given here.

It is probable therefore, that clinical advantages cannot be offered for the instruction of a large number of students, superior to those which can be furnished elsewhere, and hence that if it is undertaken to produce practitioners of medicine only, it can only be done on a small scale, and this would not be doing much more than other institutions are doing; in fact it would be to enter into a sort of rivalry, friendly of course, but still a rivalry with other medical schools.

The second existing demand is for the promotion of original research and discovery in Medicine, including the making known of these discoveries.

In this field, we do not find any organized effort being made in this Country. In no University or College, Hospital or Asylum, do we find going on systematic and scientific investigations in Physiology, Pathology or Therapeutics, such as are being made in Germany—and, less generally and systematically, yet still to a great extent and with good results, in France and Great Britain.

In the art or handicraft part of Surgery, we are doing very well; the mechanical ingenuity which leads to the contrivance of apparatus to supply the place of lost or defective parts of splints, artificial limbs, or teeth, or of tools to cut or dilate or break, needs no stimulation or encouragement. The reason is, of course, that these things, if successful, meet with immediate pecuniary reward; the good effected by them can be seen and appreciated by all. The case is different with researches in Vital Chemistry and Physics. To make these with prospect of good results requires much capital, capital in the shape of men selected for fitness for such work—in their training, which requires much more time than teaching how to cut off a leg or to bandage a broken arm—and in the shape of leisure, to work without being distracted by the necessity of labor for subsistence.

How much there is yet to be done in this field, can only be appreciated by the educated Physician, but we can all feel the force of the words of President Eliot; "Who of us but has felt at some hour of his life, that he would give all he possessed, if only the range of medical knowledge could be even but a little enlarged, if only it were known how this fatal membrane could be dissolved

away, how this hemorrhage could be arrested, how this little clot in the brain could be absorbed." The following is the opinion of Leckey: "Of all the great branches of human knowledge, medicine is that in which the accomplished results are most obviously imperfect and provisional, in which the field of unrealized possibilities is most extensive, and from which, if the human mind were directed to it, as it has been during the past century to industrial inventions, and especially to overcoming space, the most splendid results might be expected. Our most absolute ignorance of the cause of some of the most fatal diseases, and the empirical nature of nearly all our best medical treatment have been often recognized. * * *

But in the eyes of both the philanthropist and the philosopher, the greatest of all results to be expected in this, or perhaps any other field are, I conceive, to be looked for in the study of the relations between our physical and our moral natures. He who raises moral pathology to a science, expanding, systematising, and applying many fragmentary observations that have been already made, will probably take a place among the master intellects of mankind."[1]

It is not a valid objection to undertaking such research, that results are doubtful, and that the best direction in which to work is not agreed upon. "Any road," as Professor Teufelsdröckh remarks, "will lead you to the end of the world." It does not matter so much where you begin to investigate, as that you begin somewhere and keep on.

The University must proceed on the supposition that its pupils are to be men of average ability, and not of extraordinary genius; men who will do work that is put before them, but who will follow the current which leads now here and now there, so that their work must be arranged and planned for them to a great extent; and it is also true that while it is generally admitted that the encouragement of original research is of great importance, the question of how to effect this, without running the risk of doing more harm than good, is an exceedingly difficult one. So impossible has it appeared to private or voluntary enterprise, that the aid of Government has been freely invoked to set it going and carry it on, and yet there are

[1] Leckey, History of European Morals, Vol. 1, p. 166.

serious obstacles in the way of any Government which undertakes it, and these obstacles, in this Country, are so great, that at present, I do not see how they are to be surmounted directly. Indirectly, through the work of hygienic authorities, and the researches which they may be able to have made—through the formation of Libraries and Museums, and by stimulating higher medical education by offering good remuneration to medical men employed in government service, and by selecting the best men for such service as far as possible, our State and General Governments can no doubt do much, but the fact remains that there are very few places open at present for the man who wishes to devote himself to scientific work in Medicine. Rarely will he have the means and time to prosecute his studies, and if he has both, he will still lack the assistance, companionship and sympathy of men engaged in like work, which furnish that encouragement and stimulus so necessary to all but the very greatest minds.

Through a peculiar concatenation of circumstances, it is in the power of the Trustees of this University to do more for this object than can be effected by any Institution in this country, or perhaps in the world. They start untrammelled by the customs and traditions which must be kept up in European Universities, they are not subject to the political necessities which would hamper the Municipal, State or General Government, they have the means to do what is wanted if the men can be obtained, and I believe they have the means to obtain the men.

When I look at the possibilities contained in the future of this Medical Institution, and remember the thousand and one questions which it might solve, and how surely these solutions would lead to other questions, which as yet are not even asked, much less answered; when I reflect upon how much in Medicine is as yet only conjecture and theory, with no firm basis of observation and experiment, and when in examining the medical literature of the day, I see how few thoroughly skilled Chemists and Physicists are really at work upon the problems presented by the living human body in health and in disease, and how slight are the probabilities that for many years to come any Institution in this country will systematically undertake work of this character,—I find it difficult to reason coolly and dis-

passionately as to what is best to be done, and to turn back and look at the practical difficulties which are likely to arise—and which must, as far as possible, be foreseen and provided for. I have so often seen, as the result of too exclusive contemplation of his single subject, a learned man, otherwise of excellent judgment, magnify its importance out of all reason, and set aside as of minor interest all that did not relate to it, have heard the students of the Classics, of Mathematics, of Philosophy and of the Natural Sciences, each advocating the claims of his own particular branch, to the comparative neglect, or even exclusion, of all the others, that I have been unwilling to accept my own first conclusions as to what should be the objects of this University, and have reviewed them, and discussed them with others as far as I could, trying to look at them with the eyes of a judge, rather than those of an advocate. The result is, that I must say that I believe that the Medical Department is the most important Department of the University. * * * * *

In expressing the opinion that a prime object of the Medical Department should be the promotion of original research, I do not by any means wish to give the idea that this research is to be made mainly in the school itself. The object is to produce men fitted to make research, and who will take the habit of, and taste for inquiry which they have acquired here—into, we will hope, wider and more extensive fields of usefulness.

I presume no one doubts that such men are needed, certainly I do not know where many such are to be found; if I did, I should be able to make much more definite recommendations than I feel justified in making at present.

While the prime object should be what I have suggested, there are other objects, hardly less important, which must also be kept in view, such as the training of teachers, and of men in certain specialties, including the education required for the medical services of the Government, which last is of the highest importance—and which I shall again refer to.

In the April number of the Popular Science Monthly for 1877, is a short article on The Science *vs.* The Art of Chemistry, by Prof. Remsen, which is intended to show that "the attitude of the world in general towards Chemistry is peculiar, and not what it ought to

be, and that this is due to 'its close connection with matters of every-day experience, and of practical importance.'" This gives rise on the part of the public to a purely material estimate of its merits and possibilities, which, in its turn, leads the chemist to seek applause and profit, by applying himself to the Art rather than to the Science.

In the same number of the same Journal, is an article by Prof. Clarke, of Cincinnati, on "Laboratory Endowment," which looks in the same direction, urging more attention to the scientific side of Chemistry.

Now, precisely what these gentlemen wish to have done in Chemistry is what I wish to have done in Medicine, and I have no doubt that our real motive is at bottom the same. It is not that we wish to depreciate the value of the practical side of Chemistry or Medicine, but that we want a little more place and consideration for the scientific side.

We want it, because it is more attractive to us, and because, paradoxical as it may seem, we believe that the world will be greatly benefited by increase of knowledge, even when it has no practical application that we can see.

There doubtless is a Science of Medicine, nebulous and imperfect as it certainly is, and this very obscurity and imperfection are two strong reasons why I urge its claims to attention.

Just as to the geographer the most fascinating part of the map is that in which all lines disappear except those which in large type set forth "Unexplored Regions" so to the student who once fairly comprehends how vague and scattering our knowledge is as regards disease—no field seems more inviting for effort.

That the chances seem rather against than in favor of success simply adds to the attraction. This probability of failure applies only to the individual worker, and to the scientific man there can be no total failure, for the very simple reason, that the work itself gives a certain and no inconsiderable amount of pleasure independent of the results. If you take pleasure in exercise, it does not matter so much that you did not find the thing you walked out to look for.

I do not think that there is the slightest need for fear that we

shall not obtain valuable results ultimately from cultivation of the scientific side of Medicine,—but this culture should not be for the sake of the material results. As John Hunter once said in his rough style: "No man that wanted to be a great man, ever was a great man," and it is often the case, that those who talk most about the exceeding value, and loveliness, and importance of science do not seem to think in a very scientific manner. Within the last ten years, I have had occasion to examine about two hundred essays and lectures written to prove that Medicine is a science,—and each of them has rather weakened than strengthened my faith in the truth of the proposition. There is a Science of Physiology, and a fair commencement of Scientific Pathology and Therapeutics, and combining these we get, not precisely a Science of Medicine, but the scientific side of Medicine; that which deals with causation or prediction as regards disease.

Scientific Prediction that is accurate, must be able to state the effects on a given set of conditions, normal or abnormal, by the addition of a new condition such as low temperature, or a given alkaloid or salt. And, as it is quite possible to study the phenomena of Life, both in Health and Disease, and also to study the effects produced in living bodies by chemical and physical agencies without reference to practice—it may perhaps be said, that this constitutes the Science of Medicine in opposition or contrast to the Art. Yet this science, if it be admitted to be such, is not to be studied apart from the art, and although we may not have the production of general practitioners as one exclusive or even main object, yet it must not be forgotten that they must be produced, and of excellent quality, in fact that their production is the necessary preliminary step to provide the material from which we hope to develop the other desiderata. A knowledge of the phenomena of disease is as important to the Physiologist, as is an acquaintance with Physiology to the Pathologist.

The course of instruction, therefore, must include all that is required for the education of Physicians, and more, it is not a diminution or substitution that I propose,—but additions, in order to give to the students an opportunity for selection, and to secure breadth as well as depth.

I have no desire to seem to depreciate the importance of Medical

Practitioners, or of Institutions for instructing them. At some time in the life of almost every man, his comfort, if not his life, will depend on the skill and character of some physician, and if one will reflect on this fact a little, it cannot but seem strange that the public should not protect itself a little better than it does, against the grosser and more evident forms of imposture at least.

Nor in saying that if the Medical Faculty of this University shall devote itself exclusively or mainly to forming a superior class of practitioners, it will not be doing the best work, do I wish to be understood as saying that such work is not good, or of great utility.

But it will be as if the Professor of Chemistry should arrange all his teaching, with a view to making commercial analysts, or the Professor of Mathematics should try to concentrate attention upon those formulas for which some practical use can be seen.

What is desired is that the Medical Faculty shall increase knowledge,—and shall fit its students to increase knowledge,—and that its attempts to do this shall not be restricted or limited by the fact that a part of its work is to teach the practical applications of this knowledge. Let this last be the secondary and not the primary object, and by so doing, we shall be free to do, and shall have the means to do, work which is not only highly desirable, but which cannot be done elsewhere.

The Medical Schools in Boston, New York, Philadelphia, Baltimore and the West, are educating practitioners, and the supply is according to the demand. Improvements are already in progress, and will increase as the higher standard becomes remunerative. Now instead of entering upon any sort of rivalry with these schools, what I propose is, that the field shall be left perfectly clear to them, and that we undertake to do what they cannot do. Thus, this University can help them, and they can help the University, and without the slightest sacrifice of independence on either side, the Medical School (or schools if there must be more than one) of this City, and the Medical department of the University, can supplement each other's work, and thus attract to Baltimore, and supply the various needs of, Medical Students of all classes.

So far as the University is concerned, the more schools and teachers and educated men there are in Baltimore, the better—it

matters nothing whether the teachers are called Privat Docents—or Extra Mural Teachers, or Professors in the Medical Schools—the more they can and will do, the more can be left to them to do—and the University can devote its force to other work.

Having thus indicated what I think should be the objects of the Medical Department of this University, or rather the most prominent and important of them, the next point to be considered is how best to promote them. First then as to the students. What sort of students do we want?

Machiavelli, paraphrasing Hesiod, remarks that "In the capacities of mankind there are three degrees: one man understands things by his own light, another understands things when they are explained to him, and a third neither can understand them of himself nor when they are explained to him by others." (The Prince, chap. XXII.) Men of the last class are not wanted. Those of the first class are the men of genius who are few in number and can neither be created nor evolved. All that can be done for them is to provide opportunities which shall attract them, and to try to recognize them under the uncouth form in which, as in the case of Hunter, they may once in a century appear. The men mainly to be dealt with are of the second class. How are they to be selected? To what extent is it best, for the sake of the School and of the Public, to require that the young man shall have been educated before he is to be accepted as a regular Matriculant? It is agreed on all hands that our existing Medical Schools have no satisfactory standard, and that this University should set a good example in this respect. Attention has been called to the standards established in Austria, France, Germany and Great Britain, and also to those which have been proposed by the American Medical Association and by some of our Medical Schools. These last are lower than the Continental standards, but do not vary materially from the average requirements in Great Britain. They are all based upon the supposed requirements of Medical Practitioners, but I have proposed a somewhat different object, and therefore advise a different standard. If however I am wrong, and if making practitioners who can make their education pay, be the object, then I invite special attention to the remarks of Dr. Latham, for many years one of the best clinical teachers in

England, who was educated under the old system of apprenticeships, and was thoroughly convinced that the modern tendencies in education were erroneous and should be strenuously opposed. I know of no clearer or more forcible statement on the side of those who like to call themselves " practical men," than that made by Dr. Latham.[1]

I admit that the course recommended will not be popular with medical students, but I consider, not what they actually demand, but what they would want if they understood the question.

Very few of them can be expected to know what their true interests are, even if they propose to devote themselves exclusively to practice.

The majority of them propose to become Physicians in order to procure money, and suppose that it is for their interest to set up in trade as soon as possible. Moreover that course which is cheapest holds out strong inducements to them.

They cannot see that even from the commercial point of view only, as a matter of dollars and cents, it is better that they should obtain the best education possible. The public is not always sagacious, but in the long run it does somehow contrive to find out who are the skilled Lawyers and Doctors.

The badly and superficially educated Physician may for a time conceal his ignorance and unfitness if he will keep his mouth shut and refrain from putting pen to paper, but sooner or later the occasion will come when he must show what manner of a man he is, and when he comes into competition with a man who has been properly trained, he must almost invariably go to the wall. This can be appreciated, at least to some extent, by the Student who has had a proper preliminary education, and we do not often find such making the mistake of preferring cheapness and brevity in planning his course of Medical Study.

I must also remark that, if my advice be followed, some time must elapse before the good results which I hope for will become apparent. There will be no large classes, and it will seem as if the few men who will take the Medical Diploma are hardly worth the cost. These men, however, to use Holmes's metaphor, will be seed Capsules, and

[1] See London Medical Gazette, vol. xiii, 1834, p. 344, and British Med. Jour., Feb., 1864, p. 142.

the results will appear wherever they go. I do not propose that the knowledge of Medicine which they are to acquire here shall be the end of their studies, but the beginning. It will be not merely a good, but the best possible foundation upon which to form Biologists, Naturalists, Psychologists, Sanitarians, Medical Jurists and Medical Officials of all kinds.

I would advise that the Baccalaureate degree of the University be made an indispensable pre-requisite to its degree of Doctor of Medicine. The wisdom of this advice depends upon the nature of the Diploma of the Doctorate to be granted.

If this can be agreed upon, it will simplify the problem very much, and enable us to answer with some precision the question what is to be the course of instruction for the student who has fairly matriculated in the Medical Department? Admitting for the moment that means are to be provided for instruction in every branch of medical science, and for as thorough instruction in each branch as any one may desire, and also admitting the greatest freedom of choice to the student as to what he will study, it is still impossible for the University to shun the responsibility of fixing a minimum standard of qualification for its degrees: in other words, we must agree as to what is the least amount of knowledge which the authorities of this University, will accept as sufficient in a candidate in order that they may formally assert and certify that he is a Doctor of Medicine. In the first place what should be the nature of such a certificate?—is it to be confined to facts, or is it intended to be construed in a Pickwickian sense?

The granting such certificates, generally known as Diplomas, as connected with Academical Degrees, was in ancient times an important and highly valued privilege, and for a long time the degree of the Doctorate was conferred in accordance with its original meaning, that is, that the holder was qualified to instruct others, being equivalent to the title of Master, and it conferred the right to teach as well as to practice, and also exemption from taxation, and special privileges in trials, similar to those enjoyed by the clergy and nobility. In Medicine, as in the Arts, there were two degrees, and sometimes more, and in several European Countries to-day the licentiate is a different thing from the Doctorate. In the German empire this prin-

ciple is carried out in recent legislation, and while the State grants the title of practitioner, the Doctorate is the exclusive gift of the University.

In this country the degree of Bachelor of Medicine has long since become obsolete, and licenses to practice are found in but few localities—while the Degree of Doctor of Medicine has among us become to a great extent worthless. It is not singular in this respect, since the same influences have affected all our Academic honors, and an American degree of A. M., or B. D. or D. D., does not in public estimation rank on an equality with the same degrees from an English, French or German University. This is true taken as a whole, for there are great differences in the value of American Degrees, but the adulteration has been so general and great that all have lost prestige.

It is no sufficient answer to this to say that our Universities afford as good facilities for the higher education as those abroad, or that many of our graduates are equal in culture to those of foreign schools;—what we are speaking of is the Diploma and the public opinion of its value, just as if we were speaking of our legal tender notes and their value in international currency. Neither the bank notes nor the Diploma are of any value in themselves, but for what they signify.

The depreciation in value of our Diplomas, owing to adulteration, has been going on so long and is so much a matter of custom and precedent, that the issuing of such documents is no longer considered disreputable. The worthy Presidents and Faculties of the great majority of our Colleges and Medical and Divinity Schools would be greatly astonished and extremely indignant if they were told that they were engaged in swindling the public by passing off an article which is not what it pretends to be, nor what they certify that it is on their Diplomas, that they are engaged in counterfeiting and adulterating that which is, or should be, more precious to the public than its currency, that they are obtaining money under false pretences, and that their Diplomas instead of being merely laughed at, as they now are, should subject those who issue them to punishment severe enough to put an end to the production of such false certificates.

They would say—" we give such education as is required here, there is no demand in this country for such courses of study as are enforced abroad; everybody knows that our Diploma is only a certificate that the holder has had certain opportunities for study, and for that matter there never was, in any age or place, an institution of learning, the Diplomas of which could be accepted as meaning exactly what they expressed. The word Doctor has lost its original meaning and it is impossible to restore it, we can only use it in the sense in which it will be understood by the public."

There is even now however a great difference in the signification of Diplomas from different Universities, and we must ask—what do we propose that our Diploma of Doctor of Medicine shall really mean, and if this can be settled and agreed on, may it not also be possible to say in the Diploma what we really do mean.

In Degrees there is usually little or no gradation; all the holders are alike Doctors; equally learned and trustworthy; hence they must be based on a minimum standard, and it must be decided as to what is the least amount of knowledge and mental power that will be accepted as qualifying the candidate. If, to use the simile of another speaker, " the Diploma is to be worth its face in the currency of the world," this minimum standard must be equal to the highest, we must level up and not down. The possibility of variation in the Diploma is worth considering. I do not see any reason for refraining from giving a man a certificate that he is really skilled, it may be eminently and specially skilled, in Physiology or Pathology, while he only comes up to the average in, for instance, practical Therapeutics. Of course only the broadest and most clearly marked characteristics could be thus indicated, but when it can be done it seems to me that the Diploma should be made more than a mere uniform, vague statement of general qualification.

I am of the opinion that the Diploma of Doctor of Medicine from this University should be restored to its old meaning,—that the holder is qualified to teach as well as to practice. I do not mean that full blown Professors are to be produced, but that the graduates shall be men who can when occasion demands tell what they know, and why or how they know it.

Having thus defined what the Diploma should be, we can perhaps

consider the question of preliminary education in a light somewhat different from that in which the average Medical Student would be disposed to view it.

It is generally agreed that an important part of the work of preliminary education is to make the student acquainted with the uses and powers of his own mind, to train not only his hand, eye and ear but his brain, and it is probable that when the science of education or mental culture becomes a true science it will be founded upon a knowledge of the structure and functions of the nervous system.

For this purpose great aid can be obtained from the study of Botany, Natural History, and the Physical Sciences. If you wish to form an idea of the difference between ordinary and trained observation, take some plant, and having written out the best description of it that you can, compare your work with that given by a Botanist. You will probably be surprised at the number of points which you have failed to observe, and will begin to understand the difficulty which the Botanist would probably have in recognizing the plant from your description.

Another important means of culture of the faculty of observation, is by the study of drawing, and especially of foreground and figure drawing.

In the study of the human body in health and disease, it is necessary to be as minute as the botanist, and to have as clear and quick perceptions of small variations of form and color as the artist, and this not by a special effort of memory and will, but unconsciously and as a matter of habit.

The faculty of observation varies greatly in different persons; the great majority can see only what they are familiar with, and are looking for or expecting to see, but it is a faculty which can be greatly improved by cultivation—and in modern systems of education more and more attention is being given to this.

To no one is it more important or essential than to the Physician, and it should be systematically trained and exercised in his education.

Valuable however as are the faculties of memory and observation, they are only so as furnishing the materials for analysis, deduction and judgment. The mere collection of any number of raw-recruits will not make an army; in fact beyond a certain limit the greater the collection the more unwieldy and helpless and useless it is.

Now as Mill remarks, " The methods of getting at truth, and the tests of truth, are in all cases much the same. We can best learn how to ascertain truths by being shown the way in which it has already been successfully done. The processes by which truth is attained, have been carried to their greatest known perfection in the Physical Sciences. * * * The models of the art of estimating evidence are furnished by science; the rules are suggested by science; and the study of science is the most fundamental portion of the practice."

Hence comes the immense importance of making the study of Mathematics, of the Physical Sciences, and of Logic, preliminary to that of Medicine. It is not only that the facts which will be thus learned are of importance to the Physician, but that he will by such studies be taught how to think, an ability which is much rarer than is commonly supposed.

The history of medicine is full of instances in which learned and conscientious men have shown themselves utterly unable to appreciate the value of evidence; they could not see or understand things which to us appear almost self-evident.

I have said that graduates should be competent to tell what they know, and give reasons for their opinions.

The ability to do this, as well as to think accurately, and especially to reason inductively from particulars to general propositions depends very much on a knowledge of the right use of words. All have heard the saying of Hobbes, that " words are the counters of wise men but the money of fools." Mill remarks on this that the counter is much more likely to be taken for what it is by those who are in the habit of using many different kinds of counters, and that herein is the secret of the value of the study of languages, since it not only enlarges our vocabulary, but compels us to pay special attention to the meaning of words.

One of the main objects which I have proposed that medical students shall be trained to accomplish is the discovery of new truths, which implies that these truths are to be published;—to be made known for the benefit of all the world. That they may meet with appreciation and acceptance when published, it is a matter of much importance that they should be properly presented, and as the study of science teaches how to think, the study of languages teaches how to express the thought.

I conclude then that no man is entitled to the degree of Doctor of Medicine who has not studied Latin and cannot read French and German with comparative ease.

In like manner it would be easy to show that Logic and all the other branches mentioned as required by the University for its Baccalaureate degree, are necessary acquirements for the man who is to be qualified to teach as well as practice. The study of medicine in our Medical Schools, even in the best of them, does not include these studies—nor does it supersede them, and I am unable to see any good reason why the presentation of a Diploma of M. D. from another school should be considered as at all equivalent to the Baccalaureate degree of this University. It is possible to present facilities for a post-graduate course where the student whose desire is to increase his information can select those branches of which he may stand in special need, but if his object is to obtain the Doctor's degree without limitations, let him come in through but one door—that of the Baccalaureate degree. If he cannot or will not do this, give him a certificate as to what he has studied and what examinations he has passed, a certificate that he is qualified as a practitioner if such be the case, but reserve the Doctor's diploma for those who have shown themselves fully entitled to it.

Great care however would be necessary in arranging the details of such certificates, for students, like electricity, will take the shortest path.

It is to be remembered that although this standard is proposed for matriculants, those who wish to attend special courses of lectures or demonstrations need not matriculate for that purpose, and as the curriculum of study can only be arranged so as to provide for the average amount of intelligence and application, it will be perfectly possible for the man of unusual talent and power to defer his matriculation as a medical student for one or even two years—until he obtains his degree in Arts, and to do this without loss of time so far as obtaining his Diploma of M. D. is concerned. I use here the ordinary phraseology, which implies that graduation or the getting a Diploma is to be the object of the student.

It follows that a student from another School, should be allowed to matriculate at an advanced part of the course if he shows himself

fitted to do so, but that this matriculation always is on the condition that his preliminary education is tested and found up to the standard, as well as his medical knowledge, and to this rule I would allow no exception. At the Harvard School a man who comes with the Diploma of M. D. is exempt from the preliminary examination, but I think such exemption not wise nor to be recommended in this case.

It may be said that unless this exemption be allowed, we cannot furnish such a Post-Graduate Course as it is desired that this Medical Faculty shall provide. The difficulty, however, is not in regard to the course, but the Diploma, and this question of the Diploma, I have already sufficiently discussed.

Supposing that the Students have been thus selected, what course and sequence of medical study should be advised or prescribed? In answering this we have to steer between the Scylla of too great rigidity and the Charybdis of indefiniteness. The fixing of a definite curriculum has very great advantages. The Student is usually incompetent to choose wisely, he cannot be expected to know his true interests, and as a matter of fact he does not know them. The average Medical Student does not like to think for himself, or to attempt to definitely state his own opinions, preferring very much to fall back on and quote those of his preceptor or his text-books, and if left to select his own course of study he will almost certainly not do it from an independent standpoint, but in accordance with the advice of others.

Again, there is an advantage in having a certain order and succession of studies. At certain periods of life certain studies are best mastered, as expressed by Temple, Sermons, Sec. II, Sermons, XL, p. 308, 1871: "There is but a certain time allotted for each thing to be done that we have to do, whether it belongs to this world or the other, and if we pass the allotted time it is too late for that work to be done. If you are idle at school, it may for a short time make little difference, perhaps no perceptible difference at all. But after a time it becomes too late to recover what you have not chosen to take when it was within your reach. There are things which can be learnt when you are not twelve which can never be learnt so well afterwards; there are still more which must be learnt before you are seventeen or eighteen, or you can never really learn them at all."

It is proposed that the Medical Students of this Institution shall be better educated than the average, and therefore rather more competent to select for themselves, while it is in accord with the enlarged freedom of University Life that they be allowed to make such selection. It will be found necessary, however, to provide a scheme of Study, even if its adoption is to be only a matter of advice and not of command. * * * * * * * * * *

What is the course of instruction to include? There are those who favor limiting the number of subjects to which the Student's attention is to be directed, in order to secure a thorough comprehension of those which he does undertake, and this is urged on the ground that within the last fifty years the Science and Art of Medicine have undergone such great development, and that there is so much more to be learned now than there was when the present systems of instruction were established, that it is impossible for the Student to survey the whole ground, and acquire more than a superficial knowledge of any part. But is it true that the Study of Medicine has become more difficult because our knowledge has increased? Has the study of Physics become more difficult since the discovery of the laws of gravitation or of the correlation of Forces? Every new discovery in science which leads to the formulation of a general statement or law expressing the result of combination and comparison of many facts previously scattered and isolated does away with the necessity of remembering most of these facts, and of learning a number of unverified and conflicting hypothesis.

It is true, however, that the student who wishes to qualify himself to be a general practitioner cannot pursue with thoroughness many branches of study, and must select those to which he will give special attention, and those of which he will learn only the outlines and general principles. This applies to a still greater extent to the man who desires to carry on a particular form of research, but as the selections made will not be uniform, but will vary with the tastes and wants of each individual, it follows that facilities must be provided for instruction in all branches, and for special and detailed instruction in some departments.

Admitting, then, that all the usual branches of Medical Education are to be provided for, in what order should they be distributed?

And, first, should the student be required to undergo a certain amount of instruction and training before admission to the actual study of disease in the living subject—that is to clinical instruction? I have already called your attention to the remarks of Dr. Latham on this question, as summarizing clearly and forcibly the views of those who think that clinical instruction should begin at the very outset of the student's career. In certain rare cases this is perhaps best; there are men who will be led to investigate and to work in this manner, who would do very little with the theoretical branches, but for the majority of students I believe that the views of Dr. Latham are incorrect.

Some men may be taught to swim by dropping them at once into deep water, but many will be drowned in the process.

The demand for clinical teaching is a reaction against excessive or exclusive use of Lectures as a means of giving instruction, and a reaction which is natural and justifiable.

But while Demonstrations, Recitations and Laboratory work should be largely employed, Lectures are not to be given up entirely, since they are of great value to the student as saving him a vast amount of laborious research and reading, and are of great use to the Lecturers themselves, as a test of their comprehension of a subject, and of their progress in it, for one can never be sure that he thoroughly understands a thing until he has tried to teach it.

In this mixed system the objections to a separation, at least in part, of the clinical or so-called practical teaching do not apply, and this separation has so many advantages, and in the present case is so essential, that I think it must be accepted. The time which may be profitably devoted to the study of Anatomy, Physiology, the applications of Chemistry to Medicine, Materia Medica, and the general principles of Pathology and Therapeutics is usually considered to be about two years, and the arrangements for teaching these branches should be made with reference to that time. With regard to the details of methods of teaching and demonstration to be used in these several branches, it would be of course useless and improper to speak here, but I wish to call special attention to what I consider a very important means of promoting the study of Pathology and Pathological Anatomy, which can be introduced with great advantage in

the second year of the student's course, and that is the establishing a course of study of comparative medicine, with clinical facilities such as could be afforded by a small establishment for the cure of diseased animals.

Such a course would serve a double purpose. Considered with reference to the welfare of our domestic animals, and to the pecuniary interest which these involve, the study of veterinary medicine must be admitted to be of great importance, while in this country it is certainly very insufficiently attended to.

The loss of domestic animals in the United States from disease and injuries is estimated as amounting to about $100,000,000.00 annually, and it is probable that one-fifth of this might be saved by proper precautions and treatment. I do not at the present time know of any career which holds out greater promise of usefulness, reputation and wealth than that of Veterinary Medicine in this country as it might be made if taken up by a few thoroughly well educated gentlemen, starting from the basis of such an education as the holder of the Diploma of Doctor of Medicine from this University should have.

I do not think that Veterinary Medicine studied by itself, as is the custom even in the best foreign schools, can ever give satisfactory results, any more than will the study of Obstetrics or any other specialty alone.

I do not know of any institution in this country to which I can point as an example of what I would recommend, and upon the principle of trying to do what others cannot or will not do for education, this is an additional reason for attempting it here.

The relations which exist between the diseases of men and of the lower animals present a series of problems which as yet have hardly been posited—much less answered, and the investigation of which can be profitably undertaken only by those who are acquainted with both comparative and human medicine. As I have before said, one of the things which medicine now needs most is the study of pathological processes, instead of pathological results, and it is to institutions properly fitted for the study of diseases, natural or artificial, in animals that we must look for help in this direction.

It is also in this field that we may hope to discover something with

regard to the application of the laws of evolution to Pathology, an application which must certainly exist if the theories of Darwin and Spencer be correct.

It is not, however, so much with a view to the importance of the promotion of the study of Veterinary Medicine for its own sake, important as this is, that I propose its introduction into the medical course, as for the sake of the great amount of instruction which by its means can be imparted to the student before he is brought face to face with disease in the human subject. Even from the lowest point of view, that of its furnishing material for the study of the chemistry of animal fluids, healthy and diseased, and of the results of disease in the various tissues and organs, it is well worth providing, and when we look to the higher object of this University, the promotion of research, it is evident that the facilities which an institution devoted to the diseases of animals would give will be of so high a degree of importance that it may be said to be absolutely necessary that they shall, in some way, be provided.

When the student has progressed so far that he can prove himself fitted to begin his clinical studies he should enter on the second part of his course, and commence the study of disease on the living subject in the Dispensary and Hospital. With the training which he has received he will find this part of his course exceedingly interesting and comparatively easy.

The proper organization of the clinics for the Medical Faculty will probably be found to be practically one of the most difficult points to settle at first.

In this connection a scheme proposed by Prof. Ziemssen for the organization of the clinics at the University of Erlangen, will be found interesting. The number of medical students did not exceed one hundred, and of these the number for whom clinical instruction was to be provided was about 50.

For the medical clinics for this number Prof. Ziemssen thought that there should be a professor of the propadeutic clinic and clinics combined, with two assistant professors, one for diseases of the chest, the other for Laryngosscopy, Medical Electricity, &c. Besides these, three junior physicians resident in the Hospital, being recent graduates, were to conduct the pupils, divided into small parties,

through the Hospital, and instruct them in the examination of the cases. Besides these there would be the surgical clinic, with its special branches of diseases of the eye, skin, etc.; the obstetrical clinic, that for disease of children, and for mental and nervous diseases, so that for the clinical instruction of fifty students, there would be required four or five professors, and from five to ten assistants, besides resident medical officers.

In Germany and France we have seen that the clinical teachers belong to the Faculty, and the Hospitals are more or less under their control, at least so far as the clinical wards are concerned. In England the clinical teachers belong to the Hospital, and the school takes a secondary place as an appendage to, and protégé of the Hospital. In American Schools there is much variety—some have their own Hospitals and Clinics—as the Philadelphia Schools, others depend upon City Hospitals, which may even be shared between two or three schools, but the general rule is that the Clinical teachers are dependent on the Faculties.

In the case before us the circumstances are somewhat peculiar. The Hospital is a totally distinct trust from the University, having its own funds and officials, yet it is to form a part of the Medical School.

The question of funds would probably decide the question as to whether the clinical teachers should be more immediately dependent on the Hospital or the University, but of course they should be perfectly acceptable to both, and the responsibility must be to a certain extent divided. It is the University which is to grant the Diplomas, which is to certify as to the quality of the results, and which is to be responsible for the character of the clinical teaching after it has once put its seal of approval on them. The clinical teachers must therefore be such men as it approves, and in whose judgment it can trust. How far it may have to trust will depend upon the organization of the Board of Examiners.

Even those Professors in the Medical Faculty whose duties are not purely clinical, must have more or less to do with the Hospital and Hospital Staff. The teacher of Pathological Anatomy or of Pathological Chemistry, must keep in view therapeutics and diagnosis as well as his own special branch, and must be familiar with

the latest advances in these subjects or the value and interest of his work will soon begin to diminish. In so far as the teachers are students, and students they must be—the Hospital is their special field of study.

So far as the Hospital is concerned I presume that while affording the facilities referred to, it is not in any way to be an appendage to the University. It has its own work to do, and it is desirable that it should obtain the credit for it.

This Hospital is to contain 300 beds, and is to have connected with it a convalescent Hospital of about 100 beds.

It is also to have a large dispensary or polyclinic, and an amphitheatre connected with both the Dispensary and the Hospital. The Dispensary has been arranged with a sufficient number of rooms to permit of a minute classification of patients and of ample facilities for the teaching of special subjects. In connection with it I hope that it will be practicable to establish a system of medical attendance upon the poor at their own homes, a large part of the work of which can be done by advanced students under the advice and direction of the Clinical teachers.

This will be especially important for giving practical instruction in Obstetrics and in the diseases of children. The Pathological Institution of the Hospital will have its own Amphitheatre, Laboratory and Microscopical rooms, and will be so arranged that each student can work there to his heart's content.

The Hospital is planned to provide for the residence of about 25 students, besides the Medical Officers proper, and these students are expected to conform to Hospital discipline, and to take charge each of a certain number of beds. To this number of 25, I think that the number of the graduating class should be limited, and that every student should be expected to spend his last year as a resident in the Hospital in the study of the practice of Medicine and Surgery. Under proper direction, he should have cases assigned to him for investigation and suggestion of treatment, he should be charged with the carrying out of the minutiae of the treatment approved and ordered, and he should be required to report these cases in a satisfactory manner.

In succession he will thus pass through the various wards and

departments of the Hospital, and under the instruction of the several clinical teachers. The fruit of his previous studies will now become manifest, and we may reasonably hope that it will be good fruit. With regard to this recommendation of requiring every graduate to have resided one year in Hospital, and the consequent limitation of the graduating class to the number of 25, it should be considered in connection with the previous recommendation that the Baccalaureate degree of the University be made a prerequisite for the degree of Doctor of Medicine. Call this last recommendation No. 1—the limitation of the class recommendation No. 2.

Now I find that those Physicians whose opinions I have been able to obtain, and I have obtained those of at least one hundred, may be divided into three classes. The first approve both recommendations, the second approve the first recommendation but not the second—thinking it unwise to limit the number of students, as they believe that in a few years, when the value of this course of study becomes recognized, the number of properly qualified applicants will be so great that it will be necessary to refuse some, if the number 25 is to be insisted on—and the third class disapprove of the first recommendation, thinking the standard so high that very few candidates will present themselves, so few in fact that there will never be any necessity for the limitation in number, and that the results obtained will be by no means commensurate with the cost of keeping up proper buildings and an adequate staff of teachers. This last objection is the really important one, it is one the true value of which cannot be ascertained without trial, and one upon which the optimist and the pessimist will continue to hold diametrically opposite opinions.

The objection to the limitation of numbers does not seem to me important—I think it will be many years before the number of 25 for the graduating class can be reached, and when it is reached I am quite sure the time will have come to raise the standard.

It will probably be as desirable then as it is now, that there should be some institution in this country where superior facilities for, and incentives to, medical study and research can and will be provided, and such facilities will imply the exclusion of men not fitted to profit by them, in the year 1977, as much as they do to-day. When the

material for Clinical instruction which the Hospital and Dispensary can present increases beyond the limits at present contemplated, as no doubt will be the case, it will be time enough to discuss the question as to whether this increase shall be made use of to improve the quality, or enlarge the quantity of the product of the Medical Department.

With regard to the precise position of the Clinical teachers, it appears to me that if the financial situation permits, they should be employed by the Hospital, should be a part of its Staff, and that the results of their investigations and labors, so far as the advancing of our knowledge of the signs and treatment of disease is concerned, should be published by the Hospital.

Into the details of such an organization it is unnecessary to enter here, and much variation is possible, as is evident from an examination of the systems pursued in the various Hospital Medical Schools of Great Britain. The only point which I need here allude to is with regard to the means of testing the knowledge of the students.

How many examinations should there be, and at what periods?

These are usually regulated by the time which it is supposed proper to devote to certain subjects, and it has become customary to estimate the efficiency of a curriculum by the time bestowed upon it.

The great majority of students will work better under the stimulus of class companionship, and while time is a secondary matter here it is still an important one and must be considered.

The general opinion among medical men in the United States, Great Britain, France and Germany, is that the period fixed for medical study in these countries is too short. This period varies from two to five years. In Europe the opinion is very general that six years is required to fit a fairly well educated young man to undertake the responsible duties of a practitioner. I presume that a few of those possessing the Baccalaureate Degree of this University could probably accomplish the course of medical study indicated in about three years, but that the majority would find four years requisite for this purpose.

It is unnecessary and undesirable to fix directly any limit of time for study, but it is desirable to divide the examinations, and to classify them, somewhat after the continental methods.

For instance, there should be an examination at the end of the first year's course of study, in part to get certain subjects out of the way—in part to prevent the student from idling away his time under the impression that he can easily make up the deficiency in succeeding years,—a delusion which is very common. It is evident that before the student begins his clinical studies he should be examined in order to ensure that he is fitted to take advantage of them, and the examinations for the degree are a matter of course.

How should these examinations be conducted and by whom?

In giving an account of the various complaints that have been and are being made about our existing systems of Medical education, it has been pointed out that one cause of dissatisfaction is that the examination of Medical students is conducted solely by those who have been their instructors, and that there is a demand for a separation between teaching and examination. It is thought that as defective scholarship implies to a certain extent defective teaching, the Instructors will naturally be unwilling to condemn their own work, especially as their pecuniary interests are involved. This last consideration may have no force here, nevertheless it is well that the public should have some definite information as to the kind of instruction that is given, independent of the statements of teachers and pupils. To effect this it is by no means necessary to take the whole business of examination out of the hands of the teachers, and there are serious objections to doing this. It is desirable that there shall be the least possible difference between the study required for obtaining a satisfactory knowledge of the science and Art of Medicine, and that required to pass the examinations. But when the examination is conducted by some other person than the teacher, the student will always keep in view the possible questions which may come up not relating directly to his course of study and will attempt more or less cramming, as it is called, in order to be prepared for the emergency. As remarked by Prof. Jevons, "it is a matter of common experience that successful teachers usually make the best examiners, in fact examination in some shape is an important part of the business of teaching itself."

The examination at the end of the first year's study can certainly be conducted satisfactorily by the Professors under whose imme-

diate charge the student has been together with the Professors into whose departments he is about to pass. In like manner the clinical teachers should be represented at the testing of the fitness of the student to commence clinical study. At the final examination the public should be represented by some persons independent of the University and qualified to judge of the general results.

It is evident that the more we rely upon examinations, and the less stress there is put on other evidences of study, the more extensive and the more carefully arranged must be the system of tests, and the more time and labor they require on part of the examiners. This time and labor should be paid for by the candidate whether he succeed or fail, for it will have been bestowed in either case. The system of refunding in case of failure is unjust, and I think it has a bad effect on all institutions which adopt it.

The object here should not be Diploma granting, nor the setting up of an examination shop—it is to furnish the means of instruction. If a man who has graduated elsewhere wishes to add the Johns Hopkins diploma to his trophies, let him try on the same terms that its own scholars try. The requirement of one year's residence will be necessary however to secure a satisfactory examination.

Thus far we have had reference mainly to the usual work of a Medical School; namely the teaching of the fundamental principles of Medicine and the allied sciences. Another purpose has however been indicated, which requires a little farther explanation. An important peculiarity of the German University Systems, and one which to some good observers appears to be the main cause of their prosperity and reputed excellence, is the fact that the Professor, Assistant Professor or Privat Docent is expected not only to be familiar with, and to teach fully and clearly that which is already known in his own special branch; but also to actually increase knowledge in that branch by observation and experiment. This is especially insisted on by Prof. Billroth, who characterizes these Universities as combining the functions of a school and of a learned society, and claims as a result that the teaching partakes of the spirit of inquiry, and that the better class of pupils, becoming imbued with this spirit, not only make more substantial progress in their studies but are often valuable Assistants to their instructors. That there are

certain dangers in this system he sees clearly enough, and he points out that the Government has the right to demand that the people shall be supplied with competent and trustworthy Physicians, and as it is the business of the Universities to produce these they must not allow the Society to predominate over the School in their method of work. He says "The adjustment is difficult but not too difficult for German Strength."[1]

The two functions thus indicated are nearly identical to the student who is sufficiently advanced, for he can understand that the proper period of study is co-extensive with the life of man, but there is a danger lest those who are yet properly subjects of guidance should give one of these functions undue prominence over the other.

In our existing schools, the function of research has been almost totally neglected, but in endeavoring to supply this omission care must be taken not to go too far to the other extreme, lest in trying to promote science we neglect education. The practical question before us is in what way can the body of teachers and students who will be gathered here—best advance our knowledge of the causes, symptoms and treatment of disease, keeping in view the fact that the necessary course of instruction for a Physician is to be maintained, and indeed to be made a means of attaining our object?

We have seen in the history of medicine that all substantial progress has been due to observation and experiment, but that these last have often been stimulated or induced by theory.

A great obstacle to Medical progress, until within comparatively recent times, has been the fact that co-operation in labor was hardly practicable. Now while there are many problems which an individual may profitably attack, there are many others which require the united observations of many persons to give good results. In speaking of the statistical method of Louis, attention was called to the necessity of a large number of observations on any particular disease in order to reduce the mathematical probability of error to such a degree that the general results shall be valuable; and the very great difficulty which exists in obtaining observations which are capable of being compared statistically was pointed out. One very important means of promoting Medical Science, then, is by teaching young men how

[1] Billroth, Th. Über des Lehren und Lernen der Med. Wissensch. Wien, 1876, 8°.

to observe, and for many, in fact for the majority, this must include teaching them what to observe.

The majority of men are by nature incurious,—and yet most persons, if set to work on a clearly defined question, will strive to answer it. The art of asking such questions is however a special one, it requires not only knowledge, but a certain reaching out beyond knowledge. It usually happens that the man who possesses the faculty of doing this does not give his questions to the public but strives to answer them himself, and no doubt he is more likely than another man to obtain an answer.

Yet on the ordinary principle of division of labor, it would seem probable that more might be accomplished if the questioner could place his problems in the hands of those who, though incapable of originating them, may yet be able to solve them.

I may put the same idea into another form by saying that valuable aid and stimulus to advancement of science may be given by defining and marking out as clearly as possible what we do not know, and this not in general propositions but in particular instances.

To illustrate my meaning I will refer to a recent text book on Physiology by Professor Michael Foster of Cambridge.

One of its peculiarities is that in each section, what may be considered as satisfactorily proved is separated from that which is merely probable, or which rests only on the statements of an individual, and in this way almost every page is suggestive of work to be done, work with a definite end and purpose, which cannot fail to give valuable results.

A similar series of suggestions for observations in Pathology and Pathological Anatomy is even more desirable than in normal Physiology, for the reason that nature's experiments on the human body cannot be repeated at will, like those in comparative Physiology, and the phenomena must be observed as they chance to occur or not at all. I shall have occasion to speak more fully on this point hereafter, but I think it is evident that it will be good work to teach our students as far as possible, and in as much detail as possible, what are the points upon which further information is necessary, "to give them a list of desiderata," as a Librarian or Museum Curator would say.

In commencing this course of Lectures I had occasion to remark that the history of Medicine forms no part of the course of instruction in English and American Medical Schools. It is true that occasionally a few lectures on this subject have been given at one of the English Universities, but in this country nothing of the kind has appeared since the lectures of Dr. Dunglison forty years ago. Such lectures are given in France and in some of the German Schools, and they form a part of the course advised by Professor Billroth, but even in France and Germany there is much question as to their utility. The doubt is as to their real service to the practitioner, and as to whether the student who is qualifying himself to become such can properly spare any of his limited time to attend to this subject. It is said that each Professor will give in regard to his own subject all the Historical information which is of any practical value, and that for the rest it can easily be obtained from books after graduation. To the average American Medical School these arguments, as well as others founded on the necessity of preliminary education to make such a course interesting or valuable, certainly apply, but the case is different I think with regard to this University.

It appears to me that to its students an account of the various systems of Medicine and Medical Philosophy which have from time to time prevailed, of the methods in which discoveries and progress have been made, of the principal errors and fallacies which have hindered this progress, and of the lives and opinions of those who are recognized as leaders and authorities, cannot fail to be interesting and useful; that such a course would be a means of culture, a stimulus to thought, and would save much labor and research when the time comes for the student to attempt to teach, either from the Professor's chair, or through the press.

In Physics, Chemistry and to a certain extent in Natural History, the facts are either frequently repeated or can be reproduced by the experimenter at pleasure. In Medicine, as in political or social science, the case is otherwise; we must depend upon observation of conditions which may occur very rarely. Chance may present to the most obscure practitioner an opportunity for observation which the greatest master may never meet, and whether he will avail himself of it or not will depend very much upon whether as a student his

attention has been called to the possibility of the occurrence of such a case. "*Qui nihil affert nihil refert,*"—it does not follow that one sees a thing because it is just before his face. I have before alluded to the fact that it is sometimes more desirable that the student should know where a certain piece of information is to be found than that he should attempt to remember the precise information itself, just as glancing over a table of contents will often save the necessity of reading a large part of a book.

In my experience in connection with a large medical library I have found that there are comparatively few Physicians who know how to get at the literature of a subject, and they may waste hours and days in search of what a few words of advice and a little bibliographical knowledge would enable them to lay their hands on at once. To a medical writer this knowledge is almost indispensable, for without it, as Malgaigne remarks, he will be doing the work of Penelope—recommencing each that of the day before.

I have had occasion to show that the old theories are continually appearing under new names, that for instance the hypotheses of Hoffman and Cullen as to spasm had been answered fifteen hundred years before in the criticisms on the doctrine of the methodic sects, and that, mesmerism and Braidism and Electro Biology are very old theories with new names only.

But in recommending that a course of lectures on the history and literature of Medicine be provided for in the curriculum of this University I do not wish to be understood as advising the usual methods. If I may judge from the printed lectures which I have examined, such courses are very apt to become merely medical Biography and Bibliography,—or else special pleadings in favor of some particular doctrine.

In this as in most other branches, the value of the teaching depends on the teacher, and even less than in others is it possible to lay down rules as to methods, or as to amount of teaching; the subject has no limits; and each man would make a different selection, unless indeed he be merely a copyist of the work of others.

Some knowledge of the lives and opinions of the great men of his Profession should be possessed by every Physician,—the Princes of Medicine have meditated and written upon many of the questions

which still are unanswered, questions in no wise new or strange but older than the Sphynx.

Yet these questions come in slightly varied forms to each new generation, and the great majority are not sufficiently acquainted with what has been done in the way of answering them to keep from falling into errors which were pointed out hundreds of years ago. As I have elsewhere had occasion to say:[1]

"Comparatively few persons have any idea of the amount of Medical literature in existence, or of its proper use and true value, and the result is that the same ground is traversed over and over again. Cases are reported as unique and inexplicable which, when compared with accounts of others buried in obscure periodicals or collections of observations, fall into their proper place and both receive and give explanation. Old theories and hypotheses, evolved from the depths of the inner consciousness of men too zealous or too indolent to undergo the labor of examining the works of their predecessors, re-appear and are re-exploded with the regular periodicity of organic life; and even when literary research is attempted, it is too often either for controversial purposes, to serve the ends of prejudiced criticism, or to support a charge of plagiarism, or else for the purpose of obtaining a goodly array of foot-notes, which shall imply that the subject is exhausted, and give a flavor of erudition to the work. This state of things is by no means peculiar to medicine, but its literature is certainly an excellent illustration of the maxim. 'The thing which has been is that which shall be, and there is no new thing under the sun.'

"The record of the researches, experiences and speculations relating to medical science during the last four hundred years is contained in between two and three hundred thousand volumes and pamphlets; and while the immense majority of these have little or nothing of what we call 'practical value,' yet there is no one of them which would not be called for by some inquirer if he knew of its existence."

I have now to say a word or two with regard to what are called specialties in Medicine, and as to what extent it will be desirable to provide special teachers, apparatus and means for giving instruction

[1] Rept. on Med. Libraries, 1876, p. 171.

in them. On this point as upon several others in medicine there are decided differences of opinion in the Profession itself, but for the most part the controversies relate to the ethics of specialists with which we have nothing to do.

In any populous and civilized country the tendency is to sub-division of labor, to evolution by differentiation as modern Philosophers would say, and this is true in Medicine as in other arts, sciences and professions. It was so three thousand years ago in Egypt, two thousand years ago in Rome, and the tendency of modern Medicine in France, Germany, Great Britain and in this country is in the same direction. The reasons for this are stronger now than ever before, because it is no longer possible for any one man to grasp and retain a knowledge of all the branches of medical science.

From special study of one class of diseases, or of the diseases of a single organ comes increased skill in diagnosis, superior dexterity in manipulation, and fertility of invention of mechanical appliances for the investigation or treatment of disease.

On the other hand it is apt to produce narrowness of view, the assigning of an undue importance to local affections, and a strong tendency to magnify unduly the branch which the specialist professes. This is almost certain to be the case in certain specialties if they are the main object of study from the beginning, and not the outgrowth of general study and practice. Let us consider what these specialties are. They may be divided for our purpose into two classes.

The first are those which in the present day are usually the outgrowth from general practice, and may be stated as Surgery, Obstetrics, diseases of children, diseases of the Nervous System, Insanity, Forensic Medicine and Public Hygiene.

The second are those which relate to diseases of a single organ and are diseases of the eye, of the ear, of the skin, of the chest, of the throat and larynx, of the urinary organs, of the rectum, orthopaedic surgery and the diseases of women more especially those of the genitals. It will be perceived that these last are all outgrowths from Surgery, that they depend largely upon instrumental appliances, and that to succeed in them a taste for mechanical invention and manual dexterity are mainly necessary.

Clinical instruction is the main thing desired by those who wish

to follow these specialties—they wish to be able to see and compare a large number of cases of malformations or disease of the particular organ to which they are devoting themselves, and to practice the various manoeuvres and operations required until the special senses and the hands have become sufficiently dexterous.

From these considerations it is evident that it is not at present worth while to attempt to provide special facilities to attract this class of students. These specialties should be left to be the natural outgrowth of circumstances, and while in each enough instruction should be provided to meet the needs of a well educated general practitioner, it will not be worth while, at first, to attempt to make any of them prominent features either of the Medical School or of the Hospital.

It cannot be said that there is any urgent need for them at present, certainly there is much more need of some other things. With regard to specialties of the first class the case is somewhat different. For the diseases of children, Insanity and diseases of the Nervous System, Clinical facilities and material for study are still the most important requirements, and these I think it will be possible to provide in sufficient amount to warrant the making their study a prominent feature in the school. Under no circumstances however should the student be allowed to devote special attention to these studies until he has completed the general course, in other words they should be post graduate specialties, if they are to be specialties at all. I allude to them mainly for the purpose of indicating the direction in which I think effort should be first made to provide clinical material of a special class for study, and without going into particulars, I will only reiterate that circumstances are such that this can be done without much difficulty if suitable clinical teachers are obtained.

There are still left for consideration the special studies included under the term " State Medicine."

This term is not a familiar one in this country, owing to the almost total absence of the thing itself, and it is necessary to study the relations of the Medical Profession to the State in European countries in order to understand its full signification. In its widest sense it treats of preventive Medicine and of the relations of Physicians as individuals, and as a body, to the State, and includes Registration

and Vital Statistics, Public Hygiene, Forensic Medicine and the legal relations of medical men to the public and to each other. Under the provision of the Constitution of the United States it is at present scarcely possible for the General Government to exercise directly any power in these matters for the reason that they belong for the most part to the subject of Police, which is exclusively under the jurisdiction of the individual States. Almost the only channels through which the General Government can exert influence in State Medicine are the Census, legislation on Quarantine on the ground of its relations to commerce, (though this is hampered with many difficulties) and by collecting and diffusing information especially of a statistical character, through some of its bureaux.

When we turn to the individual States we find that many of them have taken almost no action on these subjects, and that in those cases in which legislation on medical or sanitary matters has been attempted it has been fragmentary in character and devised with little or no reference to the action of other States.

With reference to Public Hygiene this state of things cannot long continue, and as population increases, it is certain that we shall be guided by the experience of older civilizations, and shall recognize that even in a commercial point of view Public Health is public wealth, and that it actually " pays " to provide good air, water and food for the people, and to prevent individuals from contaminating the common stock.

It may require one or two wide spread and malignant epidemics to enforce attention to the matter, but it is to be hoped that this will be unnecessary, and that it will be perceived that the every day preventible diseases cause sufficient loss to warrant legislative interference.

In fact, there is little doubt that the people, and those who represent them in our Legislative assemblies, are even now satisfied that something should be done in this direction, but cannot agree as to what that something should be.

We have plenty of popular hygienists and would-be sanitary reformers, who wax exceeding eloquent in public meetings and through the press upon existing evils, but they either propose no remedy or what they do urge often resolves itself, upon close scrutiny, into the

giving them an office or the purchasing of their patent ventilator, filter, sewage trap or what not.

Legislation upon Sanitary matters demands all the knowledge which can possibly be supplied, and more, for which reason it must itself provide for increase of knowledge.

A competent adviser upon the subject should know both Law and Medicine so far as their possible relations are concerned—for it will be almost as difficult to obtain what is desired by combining the opinions of a lawyer who knows no Medicine and of a Physician who knows no Law, as it was to produce the Magazine Article in Chinese Metaphysics by reading up in the Encyclopædia the Articles on China and on Metaphysics, and then combining the information; while the value of the result will probably not be much greater.

The Public are disposed to look to Physicians for advice and information upon these matters, but it should be noted that the course of education and routine of duties of the average Practitioner are little fitted either to call his special attention to such subjects, or to render him specially competent to investigate or decide upon the many difficult problems which they present.

It is true that he is somewhat better fitted than other professional men to enter upon their study, he is not supposed to look upon disease as a mysterious entity, the messenger of a special providence, or to rely on a day of fasting and prayer to ward off the Cholera, and he knows from practical experience that it requires something besides filth to produce most diseases, but his studies have been directed towards Therapeutics rather than prevention, and when he is consulted, the mischief has usually been done, and he has enough to think of in seeking means to remedy the results.

From the Medical side of the questions relating to Public Hygiene must be considered the causes of disease, and the means which modern science, especially Physics and Chemistry, can furnish for avoiding, destroying or diminishing those causes, so far, at least, as they affect any considerable portion of the community. From the legal side must be considered the rights and privileges of the community as opposed to those of the individual in all cases (and such cases form the majority) in which the health of the many can only be preserved by curtailing the freedom of, or by causing actual pecuniary loss to the few.

As implied in what I have just said, the ordinary curriculum of Medical education is arranged with very little reference to the causation of disease, or at least as to remote causes, and when the Doctor is called in, unless the cause continues to act, rendering it necessary that it shall be removed before his treatment becomes of use, he usually pays little attention to it.

No doubt he often speculates as to what may have produced the trouble he is striving to remedy, but when it comes to a careful, minute, scientific investigation to determine this cause, he usually has neither sufficient motive, time nor knowledge to make it. Is it a matter connected with defective sewerage in relation to—suppose we say Diptheria? This involves questions of Sanitary Engineering, the work of the Plumber, the composition of sewer gases and tests for them, and a good practical knowledge of the use of the microscope in connection with the modes of development of the lower organisms, organisms so minute that the highest powers are required for their study. A man may be a very good practitioner without any of this knowledge, and as a matter of fact very few Physicians have such knowledge.

Or let us suppose the question is as to whether a school house is properly planned as regards heating and ventilation, in order that the children may not be subjected to the evils of foul air and improper temperature. There is nothing in the ordinary education of a Medical Man which will enable him to give an opinion which can be relied upon in so important a matter as this, and he will do well if he can apply the proper tests to decide how well the rooms are ventilated after it has been constructed. But, while the Physician has not all the knowledge required for the solution of such questions as these, he has more than the Engineer or Architect, for as a rule in this country the average member of these professions has no knowledge upon such subjects at all. Not that there will be found among them any hesitation in giving opinions on such subjects, but such opinions are as a rule not worth the paper they are written on.

It needs but little reflection upon the subject of causation of disease, especially with reference to preventive medicine, to see that the most powerful means of increasing our knowledge of the subject would be an accurate registration of diseases as they occur in various

localities, and a careful comparison of the results. Thus far we have no such statistics except those furnished by Medical Officers of the Army, and these relate only to the adult males of a floating and very unstable class of population. Mortality statistics will not serve the purpose, except to call attention to the aggravated cases of unhealthfulness, for there is no definite relation between the mortality and amount of sickness in a given place. Even Mortality Statistics are wanting for the large part of our country, and those which are furnished must be taken with many doubts and reservations owing to defective and improper returns. In speaking of the naming and classification of diseases, I have referred to the fact that the names of causes of death should be different from those used for clinical purposes. In the present mortality returns we have the clinical names, and the pathologo-anatomical names mixed indiscriminately, but this is but a small part of the difficulty. Suppose we wish to know the relative prevalence of malarial fevers in two given localities—the mortality statistics, if we had them, would give us but little information, indeed it might easily happen that five times as many cases of malarial affections should occur in the one place as in the other—and yet not a fatal case be reported. If we are to judge as to whether a given locality gives rise to consumption, or fever, or rheumatism, (and evidently this is the first step in a search for the cause,) we must know how many cases of these diseases occur in that locality, and not merely how many deaths from them have taken place.

It is also evident that we can have no scientific test of the value of measures taken to prevent disease without this same information, for although we may be able to determine that a particular system of sewerage has diminished the mortality of a town, we can infer very little as to its effect on the sickness; in fact, a distinguished English Statistician, Dr. Rumsey, considers that there are grounds for the belief that "a diminution in the rate of mortality will be found to co-exist generally with an augmentation of the rate of sickness."[1]

But as Dr. Dickson remarks, "it is the amount and duration of

[1] Rumsey, R. W. Essays and papers on some Fallacies of Statistics. London, 1875, p. 58.

sickness rather than the mortality, that tell on the prosperity of a community, or as ' Dickens, or some one writing for him said: so far as the care of the body goes, it concerns a man more to know his risks of the fifty illnesses that may throw him on his back, than the possible date of the one death that must come, and of which the time is to him personally, in spite of Libraries full of Statistics, utterly unknown and uncertain.' "[2]

How such Statistics can be obtained is a difficult problem which has never yet been fairly solved; its proper discussion requires the best legal as well as medical knowledge, for it involves the question of the relations of Physicians to the State and of the State to Medical Education, but solved it must be if Public Hygiene is ever to be put on a scientific basis and taken out of the region of cheap oratory and local politics.

I have alluded to it, not for the purpose of discussing it, for that would require a short course of lectures to itself, but to indicate one of the many ways in which the knowledge of the Lawyer should be combined with that of the Physician in matters relating to State Medicine.

If now we consider the subject of Quarantine against infectious and contagious diseases, using the word in its ordinary sense as meaning a system established by a City, State or Country, for the prevention of the entrance of persons or things which may be a cause . disease; I need only allude to the inevitable mingling of legal and medical questions in the devising and carrying out such a scheme of prevention, and to the fact that it is almost useless for a City to enforce a Quarantine by sea, if another City distant but a few hours travel by rail, and with which there is free communication, does not take the same precautions. The details of what would be generally accepted as a good and satisfactory system of Quarantine are by no means agreed on, nor indeed is it certain that such a system is possible without doing more harm than good, for much skilled research as to precisely what it is that is to be guarded against, is still needed.

It is the same with regard to many other questions affecting the Public Health,—the steadily increasing pollution of our Water sup-

[2] Idem, p. 89.

plies, the Hygiene of Schools, the construction and management of Municipal Hospitals, the regulation of Prostitution, the prevention of the sale of improper or adulterated articles of food, of dangerous and unhealthful trades and occupations, all are subjects with regard to which much knowledge is needed, and subjects, of which very few men possess all the knowledge that is even now existing and available.

There is no Educational institution in the United States which fits its pupils to grapple with such questions, and for this reason, and also because I think that the time is soon coming when the services of some recognized experts in these matters will be required, I think that this University should endeavor to provide such.

Now what should be the Course of Study for a young man who proposes to enter this field of work?

In the first place he should have a thorough practical knowledge of Microscopy and of Analytical Chemistry. He should especially study the phenomena of the lower forms of life, bacteria and microzymes of all kinds.

He should become practically skillful and accurate in analyses of Air and Water, and should be able to determine adulterations of ordinary articles of food and drink.

2d. He should study the principles of construction of buildings, both private and public, so far as sanitary questions are involved. This will include Methods of heating, lighting and ventilation, House-Plumbing, so far as relates to sinks, traps, etc., and House drainage and Sewerage.

3d. He should study Engineering so far as it relates to drainage and sewerage, should be able to make a topographical sketch of a given district, and should have a sufficient knowledge of Geology to understand the position of Strata and their influence on Sanitation.

4th. He should study the Mathematics of Statistics, and especially the application of vital and sanitary Statistics and Medical Logic.

5th. He should study the subject of legislation with regard to the prevention of disease, and should be familiar not only with the laws of his own City and State relating to such matters, but with the methods tried and the results obtained in other States and Countries in Sanitary Legislation.

6th. He should study the dangerous trades and occupations which, by the production of dust, of noxious gases and vapors, or of the contamination of water supply have a tendency to produce disease either among the workmen or among the residents of the neighborhood, in order to know in what the danger consists and how it may be best avoided.

Supposing that facilities for some such course of study as the one thus briefly and imperfectly sketched, were supplied in this University, I think there is little doubt that they would meet a real want.

Should the graduate of such a course receive a Special Certificate or Diploma setting forth his qualifications? I think this question should certainly be answered in the affirmative. Let us consider now another branch of State Medicine which is in the main included in what we call Medical Jurisprudence. Rather more attention has been paid in the schools to this subject than to Hygiene, for the reason that every Physician is liable at any time to be brought upon the witness stand, or to be called on to answer a demand for compensation for bad results of a case of dislocation or fracture. The great majority of Schools however dismiss the subject with half a dozen lectures, and nowhere are the facilities afforded for the special training of an Expert Medical Jurist. Such a course would include the special study of Toxicology, of Pathological Anatomy, of Insanity, of the principles of Life Insurance, of the law of Malpractice, of the duties of Coroners, Medical Experts, etc.

I suppose every one will admit that the public welfare requires that there shall always be available a few men prepared to state precisely the results of existing Medical knowledge as applied to such subjects. It is hardly possible that the average Practitioner of Medicine should have enough experience in such matters to give his opinions great weight, and when he is brought into Court in the character of a so-called expert witness, the result is generally very amusing and at the same time melancholy. The existing methods of obtaining and applying Medical evidence in trials of all kinds are very defective and unsatisfactory, since the so-called expert is placed in the position, not of an adviser of the Court, to give an impartial opinion upon the facts presented, but as an advocate retained for one party—to be cross-examined and discredited if possible by the other.

The result has been the production of a class of professional pseudo-experts whose "expertness" consists not so much in any special knowledge of their subject, as in the gift of fluent speech and in sufficient knowledge of the tactics of cross-examining attorneys, to enable them to retain their self-possession and keep from contradicting themselves.

They consider their functions and duties as anything rather than judicial, and are pitted against each other as if they were to testify to facts instead of opinions.

There is of course no objection to retaining an expert in a case involving medical testimony, as for instance, when the plea of insanity is offered in a criminal case, any more than there is to retaining a lawyer, but it is as absurd to receive the statements of the one as evidence as it would be those of the other in the way it is now managed. The time will probably come in this country when the State will in some way have its own experts, possibly among its public health officials, just as it now has its Judges or prosecuting Attorneys, but were such a system to be attempted just now, I fear there would be great difficulty in finding a sufficient number of men with such qualifications as such a position requires.

Cannot this University provide the means of instruction suited to fit a few men for such positions, and give to those whose proficiency it has satisfactorily tested a Diploma which shall be their guarantee of fitness and ability? It seems to me that such a course is both possible and highly desirable, and I believe there will be no lack of employment for men thus qualified. The knowledge of Chemistry, Toxicology, Morbid Anatomy, Statistics and Law, which must be acquired in such a course, can of course be imparted here to those fitted and willing to receive it, but one of the subjects of study is more difficult to provide for, namely, the Jurisprudence of Insanity. The facilities required to make the student master of this exceedingly, and steadily increasingly important branch of Forensic Medicine, require very careful consideration, much more indeed than the brief time remaining at my disposal will permit me to give. These facilities must be clinical, for the only way to understand insanity is by studying the insane themselves. Leaving the matter of the Jurisprudence of Insanity out of the question, I have already indicated the subject of mental disease and diseases of the nervous

system as one of the specialties which I recommend should be provided for here, because there is actual need of such provision.

There is scarcely any subject with regard to which there is more uncertainty among the public at large than with regard to the proper mode of dealing with the Insane. As Dr. Laycock says:[1]

"The public mind in general, ignorant of its (insanity) nature and causes, vacillates to and fro with a lamentable mutability of purpose;—being now full of sympathy for the insane, and indignant at their detention in safe custody; now horror-struck by some terrible act of insane violence, and indignant that the wretched sufferer should escape the vengeance of the law."

And not only is this true with regard to the general public, but it applies also to a considerable extent to members of the learned Professions. Not many Clergymen, Lawyers or Physicians can be found who have really considered the questions, of the proper relations of the State and of Society to the insane, of the responsibility for their actions which shall be considered proper, and of the limits which shall be placed in defining the legal meaning of that very indefinite word, "Insanity."

That the State must assume the care of the individual who is by reason of disease unable to take care of himself, is now generally admitted, but whether the State has any rights or duties in relation to protecting itself or its citizens, from such individuals, is a question which has been very little discussed. The danger to the State from an insane man is not only from the crimes which he may commit in his paroxysms of Mania, but also, and to a much greater extent, from the peculiarities which he will transmit to his offspring. So far as society is concerned, it is much better that a man who is insane in the ordinary sense of the word, should be from the beginning hopelessly and incurably so.

The study and treatment of Insanity require special knowledge and training in addition to, and by no means in the place of, a first class medical education.

In this country, how and where is this special training to be obtained? Of course it can only be in the Asylums themselves, and

[1] Mind and Brain, Lond., 1860, Vol. 1, p. viii.

what facilities do they afford? The answer is, none or next to none. If the young Physician who desires to study this subject is able to obtain a position as resident in an Asylum—he will be able to see cases, it is true, but will receive little direction or aid in their study. The great majority of Superintendents have not had the scientific training, nor do they have the necessary inducements to enable them to study their cases as they should be studied. They are rather Hotel keepers than Physicians, they are good authorities on Heating and Repairs, the price of beef, the details of Housekeeping, and the profits of farms and gardens, but where are the contributions to our knowledge of this disease and of the best methods of its treatment, which our Asylums ought to have furnished? With two or three honorable exceptions they do not exist. The statistics of these Hospitals are often improperly kept, many cases of cure being reported which are by no means such. Thus at one institution, according to Dr. Earle, 1,841 persons actually treated, were reported as 2,308 cases, the number admitted twice being 280, thrice 81, 4 times 33, &c., and one patient admitted twenty-two times and discharged cured every time.

There is now in course of construction near this city an Asylum arranged upon a special plan, which it is hoped will tend to materially increase the percentage of cures mentioned above, and besides this, there are in the immediate vicinity of Baltimore other Asylums, so that an ample amount of clinical material is at hand. I trust and believe that it will be possible for this University to make such arrangements as will not only enable it to use these establishments for instruction and increase of knowledge, but as will be of marked advantage to the Asylums themselves.

Another branch of study alluded to as one with which the Medical Jurist should be familiar is Life Insurance. Within the present century this has become a great commercial interest, involving at the present day probably a thousand millions of dollars, and to manage such important interests there is need of men specially trained for the purpose. In my opinion a medical education should form part of this training, but the ordinary medical education is by no means sufficient to qualify a man to be even a medical examiner only, much less to discuss the questions of influence of Race-heredity, locality,

Anthropometry, Life probabilities, etc., which Life Insurance involves, nor to make use of the fine opportunities which a large Life Insurance Company presents of adding most materially to our knowledge upon these points.

One more special indication which this school should attempt to meet may be mentioned, and that is to provide means of instruction for Medical Officers of the Army and Navy.

The duties of such Officers are very multifarious, and as they are often in positions where they cannot consult with others, it is desirable that they should be prepared to meet all emergencies. In almost all civilized countries, except the United States—there are special schools under charge of the Government for educating such Officers, and it has been proposed to establish such schools in this country. There are however some very serious difficulties in the way of doing this. An Army Medical School for instance should be in or near Washington in order to have the advantage of the fine Library and Museum under the charge of the Medical Department there, and of the studies of the Medical Officers connected with those institutions, yet it would not be possible to provide there the means of clinical instruction required, and it would probably be impossible to obtain authority and means for establishing such a school, without running great risks of being hampered by appointments which would not be satisfactory.

It appears to me that all the peculiar advantages of such a school can be furnished here. Washington is but an hour's ride away, and thus there is no difficulty in making use of the collections there, while the disadvantages and burdens which might be imposed on the Departments, if they undertook to carry on a school themselves, would thus be avoided. The Army and Navy Medical Officers require some special means of instruction, not only before they enter into the service, but at intervals afterward. After they have served five or six years on the frontier or in distant stations, they must undergo a second examination before a Government Board.

Prior to coming up for this examination, it is very desirable that they should have the opportunity of reviewing their knowledge and of becoming acquainted with the latest advances in Physiology, Pathology, Diagnosis and Therapeutics. They can always obtain a

leave of absence for this purpose and would certainly come to this place if their peculiar needs were provided for, since it would give them most convenient access to Washington.

The possessor of the degree of Doctor of Medicine of this University, if it is such a degree as I have indicated, would be sure of being able to obtain a position in the Medical Staff of the Army or Navy of the United States, if he desired it, and it would be a wise proceeding on the part of the Government to make the position such that the holders of such Diplomas would desire it, and that only such could obtain it.

Having thus indicated in outline the plan of organization of the Medical Department of this University which seems to me desirable, the next question is,—how much will it cost?

Without going into details, I would reply to this that the annual cost of such a Medical Faculty as I have proposed would be about $60,000.00. This includes Salaries, Laboratory expenses, care of buildings, etc., but it does not include the cost of instruction preliminary to the Baccalaureate of Science nor that of Clinical Instruction.

In conclusion, I may remark, that if this plan be approved and followed, it is probable that none of us will live long enough to see the perfect fruits of it. Yet it does not seem to me to be a mere vague dream that those fruits, in the shape of additions to human knowledge and human happiness, in the shape of men of whom this country may well be proud, and in the shape of honor and fame for the institution which has produced such results,—will surely come, come for our children's children, though not for us.

And our duty under the circumstances is clearly and briefly indicated in that best of all books, to be consulted where a question of duty is concerned.

"Behold the husbandman waiteth for the precious fruit of the earth, and hath long patience for it, until he receive the early and the latter rain. Be ye also patient."

JOHN SHAW BILLINGS AND THE HISTORY OF MEDICINE*

SANFORD V. LARKEY

In his plan for medical education and research, the history of medicine was to Billings both an end and a means. As we have seen,[1] his significant lecture on "Medical Education" was the culmination of a series of twenty lectures on the History of Medicine, Medical Legislation, and Medical Education, in which he had made a survey of medical thought from earliest times in order to give the background for the ambitious scheme he proposed for the Johns Hopkins Medical School and which he expounded with such telling force. In this essay and in his review "On Higher Medical Education,"[2] which also contained material from his course of lectures, he showed a profound knowledge of the history of medical institutions and of medical education, and it was this feeling for history as a living thing, linked with his sense of practical reality, that made his arguments so convincing.

Furthermore, in his lectures and in other writings he emphasized the importance of instruction in the History and Literature of Medicine in the medical curriculum, and it is of his ideas and work in Medical History that we are now to speak. To him the History of Medicine was not dry antiquarianism but a vital element in the training of a scientific physician. He once said: "It is very rare that a man ignorant of the history and literature of his profession achieves great success."[3] He felt that instruction in the subject

* Read at the meeting held at the Johns Hopkins University and Hospital, April 12, 1938, in commemoration of the centenary of Dr. Billings' birth.

[1] Dr. Alan M. Chesney's paper, "John Shaw Billings and the Johns Hopkins Medical School," read at the memorial meeting, and published in this number of the *Bulletin of the Institute of the History of Medicine*, and Dr. Chesney's foreword to the reprints of Dr. Billings' two essays, also in this number of the *Bulletin of the Institute of the History of Medicine*.

[2] *American Journal of the Medical Sciences*, 1878, n. s. vol. 76, pp. 174-189. We are indebted to Miss L. E. Lavarella of the Registrar's Office for uncovering valuable material on Billings, including this review.

[3] In his unpublished lecture of 1877 on John Hunter, whom he considered the exception which proves the rule.

would be of great value not only in teaching students how to think but also from a purely practical point of view in teaching them how to use books.[4]

In the 1877 lecture[5] he showed he was aware of the argument that the average medical student did not have much time to devote to medical history and of the view that the professors of each course would probably give all that was necessary, but he felt that while this might apply to the average American medical school the case was somewhat different at this University, where he was hoping higher standards would be in force. Since in his plans its students were to be a picked group and many destined for research careers it was essential that they have some idea of the various systems of medicine that had prevailed in the past and of the methods used in achieving the discoveries that were making such a revolution in medical science. It was also equally essential that they know of the errors and fallacies of the past, those views that had held thought in an iron grip and had hindered progress. But he was far from satisfied with the usual methods of teaching, since he believed that such courses tend to be "merely medical Biography and Bibliography." Instead the course should be more of the history of medical ideas and their relation to the history of culture in general.

In 1883 he again made a plea for a course at Johns Hopkins in an address to the Medical and Chirurgical Faculty. He hoped that the scheme of higher medical education about to be organized at the Johns Hopkins would include instruction in bibliographical and historical methods as well as in those of the laboratory and clinic.[6]

[4] "Our Medical Literature." *Transactions of the International Medical Congress*, London, 1881, vol. 1, pp. 54-70. In this remarkable paper Billings made a survey of the medical literature of the day and explained with great clarity the problems of practical bibliographical research. It can be read with profit now. It was reprinted many times, and translated into foreign languages. It was received with great acclaim at the Congress, and Sir James Paget, the President, said "that if this single paper were the sole production of the Congress it was worth coming here to meet that it might be produced." This praise is indicative of the great esteem in which Billings was held in England.

[5] For his complete discussion the reader is referred to the reprint of this lecture in this number of the *Bulletin*.

[6] *Transactions of the Medical and Chirurgical Faculty of the State of Maryland*, 1883, p. 79.

It was not only of the student that he was thinking, but also of the part that the history of medicine might play in the life of a cultured physician. He felt that a doctor who had around him books on medical history and some of the old classics into which he dipped in his few hours of leisure " is a man of more culture and broader views than the one who has only the modern manuals, or rather those which were modern when he attended lectures.[7]. . . It certainly does not cause a lower estimate of his ability as a practical physician and surgeon to know that he reads something else besides manuals and text-books." [8]

Now let us see what he did to put these ideals into practice at the Johns Hopkins. In the year the University opened, 1876, he was appointed Lecturer in the History of Medicine, and at the same time was medical adviser to the Trustees of the Hospital and was working on the plans and construction of the Hospital. He was scheduled for a course of ten lectures in January 1877, of which we have no record. In the autumn of that year he gave the course of twenty lectures mentioned above and of which we fortunately have a large part of his notes.[9] In this series he gave a comprehensive picture of medicine from the days of primitive man, always emphasizing the effect of thought at various periods on the thinking of our own times. Some of his ideas will be treated in more detail later. From the President's Report for that year we learn that there was an average attendance of forty-nine at these lectures in the old Hopkins Hall.

One of those attending this course was Dr. W. H. Howell. This was the year before he entered the University and he had gone to see Dr. Gilman about taking work leading to medicine. Dr. Gilman advised him to go and hear Billings, and Dr. Howell has told me that this survey of the history of medicine was very stimulating and made him gladder than ever that he was going into medicine. He said there was one amusing remark about King Asa that he

[7] " Literature and Institutions." In *A Century of American Medicine, 1776-1876.* Philadelphia, 1876, p. 350.

[8] *Transactions of the Medical and Chirurgical Faculty of the State of Maryland,* 1883, p. 79.

[9] See Appendix for a list of these lectures.

had never forgotten, and which was a good example of Billings' dry sense of humor. Fortunately I found this quotation in Billings' notes and so am able to give it. After speaking of the Jewish priests as the chief physicians, he says: "That there were other physicians is probable from the grimly sarcastic account of King Asa who 'in his disease sought not to the Lord but to the physicians. And Asa slept with his fathers.'"

He does not appear to have given any more courses in the next few years, but he was in close association with the University and the Hospital. It must be remembered that it was in these years that he was planning his two monumental works, the *Index-Catalogue of the Library of the Surgeon General's Office* and the *Index Medicus*; was working on the organization of the National Board of Health; and was supervising the vital statistics of the Tenth Census.

In 1883, when the Medical Faculty was formed, he was appointed Professor of Hygiene, but since he felt he could not leave the Army he reluctantly refused the offer. So instead he was made Lecturer in Municipal Hygiene, and in the spring of 1884 gave a course of twelve lectures. When the Hospital opened in 1889 he was placed in charge of the Department of Hygiene and of the Hygienic Laboratory. For two years he gave courses in the subject to the graduate students in medicine, but in 1891, although still retaining his title of Lecturer in Municipal Hygiene, he gave three lectures in the History of Medicine, which he continued in the following year.

When the Medical School opened in 1893 he was appointed Lecturer in the History and Literature of Medicine, which post he held until his resignation in 1905. At first the lectures were still for the graduates, but in 1895 they appear in the curriculum of the Medical School. In the announcement for 1897-98 the lectures are listed for the third year—"attended by all students." From 1902 on the lectures appear to have been for third and fourth year students, at 4:30 Friday afternoons.

From his notes it seems that these lectures followed the same plan as the course he had given in 1877, only they were spread over a number of years. Thus in the first year he covered the ground of the first three or four lectures of his earlier course. The course was continued in the next year and so on. Thus it was about six years

before he had completely covered the subject. It can be seen that this was not as satisfactory as his first course, and left much to be desired. It must not be inferred that he had simply used his old notes, for it can be seen from those that we still have that he had modified his lectures very extensively, bringing in the latest results of historical research. These interpolations are of value in showing how closely he followed the literature and how sound were his judgments of contemporary scholars.

It must be remembered that at the same time Dr. Osler and others were also giving instruction in the history of medicine by relating the historical standpoint to the clinical teaching; by having informal gatherings; and by the many fine papers given at the monthly meetings of the Historical Club.[10] In the early years Dr. Billings gave a number of talks at the Club, some of which appeared in the Johns Hopkins Hospital Bulletin.[11]

From his lecture notes and from his published writings one gains the realization that Billings was as great an historian as he was great in everything he attempted. He saw the subject in its broadest implications and was not content that it develop independently of other realms of thought. He expressed his point of view in his introductory lecture at the Lowell Institute of Boston in 1887:

[10] William Osler, "A Note on the Teaching of the History of Medicine." *British Medical Journal*, 1902, vol. 2, p. 93. In this note Dr. Osler says attendance at Dr. Billings' lectures was optional.

[11] "Rare Medical Books." *Johns Hopkins Hospital Bulletin*, 1890, vol. 1, pp. 27-31.

"Symphorien Champier." *Ibid.*, 1893, vol. 4, pp. 99-100.

"John Arderne and Early English Medical Writers." *Ibid.*, 1894, vol. 5, pp. 21-22 and 67.

In 1893 he gave two other lectures at the Historical Club, one on "John Hunter" which probably was similar to the lecture quoted in this paper, and one on the "Operation of Lithotomy," most of the material of which appears in his History of Surgery.

For the biography of Dr. Billings the reader is referred to Dr. Fielding H. Garrison's delightful memoir, *John Shaw Billings*, G. P. Putnam's Sons, New York, 1915, which contains a good bibliography. However it does not list the papers cited above or the review "Higher Medical Education."

Two other valuable biographical sources are *National Academy of Sciences. Biographical Memoirs*, Washington, 1917, vol. 8, pp. 373-416. *Biographical Memoir of John Shaw Billings, 1838-1913, by S. Weir Mitchell, with The Scientific Work of John Shaw Billings by Fielding H. Garrison*; and H. M. Lydenberg's *John Shaw Billings*, Chicago, 1924.

"To attempt to isolate the history of medicine, and to comprehend its curious ebbs and flows of doctrine, from medical writings only, is like cutting a narrow strip from the centre of a piece of tapestry and speculating upon the origin and purpose of the cut threads and fragments of patterns that may be found in it.

"We cannot appreciate Hippocrates without some knowledge of the Greek schools of philosophy; we cannot understand Galen, without knowing the teachings of Plato and Aristotle; it is not possible to see why such strong opposition was made to Vesalius and Van Helmont if we know nothing of the history of Catholicism and of the Protestant reformation; and the existing differences in regard to medical legislation and education in civilized countries cannot be fully appreciated without information as to the mode of development of the polity of the several States.

"Medical history, in fact includes much that belongs also to the history of philosophy, jurisprudence and science, the chief difference being that different names are used as mile-stones and guide-posts."[13]

At the same time he felt that medical history could contribute to general history. As an example he pointed out the profound influence the great epidemics had had on the political and social history of Europe, but that the effect of these terrible visitations of disease had, in his time, not been fully appreciated or adequately investigated by historians.

Throughout his lectures he related the medical ideas to the activities and thought of the period. Thus he begins his lecture on Paracelsus by giving the setting of the year 1520, showing what events were transpiring in the Europe of that day and who were the principal actors on the scene.

In his lectures on Primitive Medicine he pointed out how many of the ideas of ancient races and of modern savage tribes had their counterparts among the more civilized peoples of our own day, and how necessary a knowledge of such influences was to a true understanding of human psychology, not only as it influenced the reactions of the individual patient, but also as it hindered the development of

[13] "The History of Medicine." *Boston Medical and Surgical Journal*, 1888, vol. 118, p. 29.

scientific medicine. But in speaking of ancient medicine, as for instance of the Egyptians, he was careful not to make too close an analogy with the practices of modern savages. The lack of such caution by other writers has led to many misconceptions of the medicine of the great early civilizations. The notes of the 1877 lectures well express his views.

" Comparing the records and traditions relating to Egypt, Chaldea, India and Persia, it is, I think, evident that a very considerable degree of culture and scientific development had been reached in Egypt long before similar progress had been made in India, and the same is true for Mesopotamia, unless the age of the Vedas has been underestimated by at least a thousand years, or else that the beliefs and superstitions of the aboriginal Turaman inhabitants of India were accepted to some extent by their Aryan conquerors which last supposition seems not improbable. It is also clear that several thousand years ago a stage of mental development had been reached which is widely different from that presented by savage tribes now in existence. . . . We must be cautious, then, in comparing the Medicine Man of the Sioux or Cammas with the Egyptian priest, the Chaldean Magus, or the Aryan Brahmin; but all present this in common that they mingle religious beliefs and ceremonies with their theory and practice of medicine, and all attempt to act on the body by remedies addressed to the mind through the special senses, a method of therapeutics which merits more attention and scientific investigation than it has yet received."

One is tempted to give many quotations from these unpublished notes, but a few that are particularly typical must suffice. One thing in which he was especially interested was the ideas that lay just outside the realm of rational thought, the primitive beliefs as mentioned above, and the metaphysical and mystical concepts of the alchemists. In his lecture on Paracelsus and his followers he gives a very good analysis of the basis of their thinking:

" I have already told you that alchemy is a branch of magic, and that its doctrines came from the far east through the Jews and Arabs. The love for the marvellous and strange is almost an essential part of human nature. As children we have all listened eagerly

to the nursery tales of Jack and the Bean-stalk, and the Seven Swans, and we may remember that fairies and genii seemed as natural and reasonable as cannibals or gorillas, while it was much more satisfactory to hear about their exploits.

"In the childhood of nations it is not otherwise, and thus the myths, legends and parables of the ancient east became to some extent real histories to the West.

"Among these parables came that of alchemy, curiously twisted and deformed by its passage through the Neoplatonists of Alexandria, and through the Arabian chemists.

"It is by no means true that all works on alchemy relate to the transmutation of metals or the making of gold.

"From the point of view of one adept it is a religion, in which the chemical jargon is used to teach doctrines which could not safely be plainly spoken;—from another side it is a system of philosophy,—and again an art.

"I have, already, in speaking of magic as a system of philosophy, explained that it rests on the belief in the existence of a subtle, all-pervading ether, which is neither matter nor spirit, but the connecting link between the two. This theory is the corner-stone of the doctrine of Paracelsus. He called this Ether the 'Ens Astrale,' the great M, or the Astral light. He thought that it was an emanation from the stars, and that every individual had his own portion of it.

"If you wish to know more of his theories on this subject you will find them very fairly set forth in two novels by Bulwer 'Zanoni' and the 'Strange Story.'

"It is very hard to think in the abstract. Properly speaking there are but two abstract sciences,—logic and mathematics. In all reasoning or speculation about medicine we use conscious or unconscious personifications when we attempt to use abstract terms.

"The name which we at first employ to designate a certain unknown thing, like the mathematical x soon assumes an individuality and becomes personified to us. For instance we habitually speak of life, disease and death, as if they were individual entities; we say that disease attacks a person, that it is driven out, &c. So each form of disordered action after it is sufficiently identified and individualized to receive a name, becomes soon, in common language, an indi-

vidual thing. We speak of cholera as travelling, of smallpox as being stamped out, of fever as consuming the tissues. In the great majority of cases such personification does no harm; but the power of names and words is very great, and every now and then it happens that treatment is based on the existence of the personification which is but a figment of the brain of some poetical or imaginative thinker. The less a person is accustomed to define strictly the meaning of the abstract terms he uses, the more certainly will he be led into error from this cause. As has been before pointed out this has been the case with regard to the use of the word Nature. As actually used by the majority of writers it means a feminine impersonification of Superior Power, that is of Divinity. To those who are familiar with ancient art and literature this is represented by the Sphynx. Now to understand the meaning of magic and alchemy, and their spirits, good and bad, their, to us, absurd doctrines, and the power of the faith which they had in them, which was so great that the fear of death at the hands of the Inquisition was not sufficient to restrain men from devotion to them, we must bear in mind these points."

Mesmerism and Homeopathy were to him the modern results of Paracelsianism, an influence which he expected would persist.

"Of one thing we may be sure: that the essential nature of Paracelsusism still survives, and will from time to time reappear in more or less eccentric forms; but always with two characteristics. First, the absence of true scientific observation and experiment. They never make any advances in anatomy, physiology, pathology, or diagnosis. Second, they are marked by loud and positive statements that every one who does not subscribe to the doctrine is utterly and entirely wrong.

* * * * *

"In speaking of the methodic sect I have hinted that the self appointed medical reformers who undertake their work by a new theory which is to be a short cut to wisdom and a royal road to practise are to be looked on with much scientific scepticism. History teaches that it is not by such that real reforms and substantial progress are ever effected; yet they have their use as speaking trumpets to proclaim the disbelief which has been gradually spreading,

and to break down dogmatic traditions which are preventing progress. Their good effects are destructive, not constructive."

Another example of this interest is his paper "The King's Touch for Scrofula"[18] given at the Charaka Club, of which he was one of the founders. In this he attempts to give a rational explanation for the reputed cures.

Although he was a profound student of the occult philosophies and delighted in tracing their development and influence, he did not allow a discussion of them to play an inordinate part in his lectures. As can be seen in the Appendix he followed his lecture on the Paracelsians by speaking of what he termed "a totally different class of men, the observers and investigators." Probably the best of these talks was the one on John Hunter, where after treating in detail his contributions he gives the following estimate of the man:

"It is exceedingly difficult to estimate the amount and value of his contributions to medical science, or to understand what he really meant by some of his very obscure sentences. He was no scholar and troubled himself very little about what others had done, or about the opinions or theories contained in books; in fact it is not easy from his writings to discover that he ever read any books. He made his own observations, experiments and deductions, without reference to the work of others, and the result was that he sometimes repeats discoveries which had been made long before his time, although it is safe to say that he never worked on any subject without casting a new light upon it. He was a great thinker—one of those men who appear only at long intervals,—who revolutionize existing methods; but he is peculiar in this that he was not a clear thinker, or at least could not express his thoughts clearly. This was no doubt due largely to his very defective education as a youth, and I have no doubt was one of the main reasons why he published so little until late in life.

"Sir James Paget in the Hunterian Oration of the present year points out that 'he was at work for eighteen years before he published anything in his own name. He was forty-three when he published his first work, that on the teeth, and for his great work on

[18] *Proceedings of the Charaka Club*, 1906, vol. 2, pp. 58-71.

the blood and inflammation he may be said to have begun collecting materials while he was a student . . . he worked at it for forty years, and he had only just begun to print it when he died.'

" This is attributed by Sir James to his caution and desire for accuracy; but I would add that he had to learn how to give his message intelligibly. Hunter says himself that his special inducement to undertake lecturing was 'the great advantage every one finds by putting his thoughts into writing. A man can never tell how much he knows till he arranges his knowledge, and then he can tell how defective it is. Hence it is that all the authors of any consideration in physic have been public teachers.'

" When it is said that Hunter was a great thinker it must not be understood that he was a good logician. He was not a master of the meaning of words he could not define, nor set forth the connection of his ideas, and, as Sir James Paget remarks: 'Thoughts and words are so closely interwoven that each shares always the qualities of the other. They are like mutual reflectors: if either of them distorts an object placed between them the other cannot but receive the distorted image and reflect it.' I think it probable that the reason why he worked eighteen years before publishing was because he had not been able to say what he wished, not because he had no desire to speak;—and that his own explanation of why he began to write is the true one. Gradually he did learn to reason and to communicate his thoughts, though always in a style obscure and disconnected, and as the power increased, so did the taste for exercising it."

* * * * *

" The character of John Hunter is in many respects a puzzling one, and I have not found the difficulty of understanding him and his work cleared up by the many dissertations and eulogies which have been published upon them. Certainly he was a tremendous worker: his labors were almost incessant, and in this he was like Haller; but in almost every other respect the two men form a complete contrast. The Swiss was learned in all the knowledge of his time, was a man of great refinement and culture, and was religious to such an extent that in the latter part of his life he became excessively narrow in his views. The Scotchman was ignorant of almost

everything outside the pale of his own observation, was rough and uncouth in manner, and was certainly anything but a devotee.

"It is probable that the ignorance of Hunter of what had been done by others was not so great as has been inferred from the fact that he rarely quotes or refers to others; but it should be remembered that he was for a long time associated with his brother who was certainly well acquainted with medical, and especially with anatomical and physiological literature, and that he daily met with men of culture and information. It appears to me that much of the work which he did while with his brother, and of the peculiar direction of his studies in after life was due to the pleasure which he took in the mechanical process of dissection. Even in the last years of his life Dr. Abernethy says that 'he would stand for hours motionless as a statue, except that with a pair of forceps in either hand he was picking asunder the connecting fibres of some structure that he was examining.' That to some persons this is a real source of pleasure I am sure, for I have known one or two men whose greatest delight was in the injection and preparation of specimens, not really for the sake of any knowledge to be gained thereby, but in part for the sake of mechanical exercise, in part for the pleasure in overcoming difficulties or of being able to do things in attempting which others have failed. Hunter went far beyond this it is true, but at first I think it was a powerful impelling motive. As a collector, observer, and experimenter, he certainly deserves all the praise bestowed on him; but it is more doubtful about his title to be called a great thinker. I should rather call him a shrewd questioner; but, as has been pointed out, his want of knowledge of language prevented him from being a good reasoner. He was himself perfectly aware of the utility of preliminary education and the value of literary research, and urged the formation of a library upon the College of Surgeons. Like Boerhaave he effected a great work through his pupils, Jenner, Abernethy, Astley Cooper, Physick, Home, and others, all of whom were trained by him and perpetuated and expanded his teachings. Since his day mere mechanical dexterity with some knowledge of ointments and plasters is no longer thought sufficient for the stock in trade of a surgeon.

"His example is often quoted by those who wish to depreciate

the value of a liberal education as preliminary to the study of medicine; but we have in this country tried pretty thoroughly the experiment of relying on uncultivated genius and have not yet found a second Hunter.

"The possibility of such a case may well be kept in mind by university authorities, for it is their business to, if possible, recognize genius on the rare occasions when it comes into their hands; but I do not see how it follows that all average men are to be treated as if they had powers which they never show the slightest sign of possessing. No school can do much at first for such a man as Hunter: if brought to it he will not study; what he is to begin with is nature itself, and in his own way."

The independence of judgment shown in this extract is illustrated elsewhere in his lectures. He disagreed with Malgaigne and Daremberg as to the anatomical and physiological knowledge found in Homer, feeling that it did not imply any more knowledge than possessed by every butcher. Again, in criticizing Daremberg on Egyptian medicine, he expressed a view that is only now coming to be fully appreciated.

"Daremberg thinks it improbable that any of the Oriental nations had anything that may be called scientific or natural medicine, i. e., medicine not connected with magic or exorcisms, prior to the Greeks; but since he wrote considerable advance has been made in our knowledge of ancient history, particularly as regards Egypt, and I think there is no doubt that from the earliest times in Egypt and India there were ordinary practitioners as well as priestly ones, and that these last had two systems—one to impress the public and the other for practical use."

From all of his historical writings it is evident that he relied largely on the original works rather than on secondary sources. He was no mere bibliographer and one realizes that he must have read carefully most of that great store of old books that he was gathering together in the Surgeon-General's Library. His "History of Surgery"[14] shows his wide acquaintance with the writings

[14] "The History and Literature of Surgery." In Frederic S. Dennis' *System of Surgery*, Philadelphia, 1895, vol. 1, pp. 17-144.

in this field, both ancient and modern. As both Dr. Welch and Dr. Garrison rightly said, it was the best work on the subject in English, and it remains so today.

He was the great pioneer of the history of medicine in this country. Not only did he demonstrate the value of the subject in medical education and put his ideas into practice, but he collected our greatest library and in conjunction with it gave us our essential bibliographical tool, the *Index-Catalogue*.

In 1876 Billings, speaking of Daniel Drake, said he was " a man whose fame, as compared with that of his contemporaries, will probably be greater a century hence than it is today."[15] This prophecy which has already come true might very well apply to Billings himself. For at the time of his death in 1913, although his reputation abroad was great, as Dr. Welch pointed out, some of the speakers at the memorial meeting at the Johns Hopkins Historical Club[16] felt he was not appreciated as much in his own country as he should have been. Thus Dr. Norton said: " His friends, of course knew his large powers, but he had none of that United States reputation that some men of much less worth and ability have." But as Dr. Halsted said: " Dr. Billings was too great a man to be fully appreciated in his time. The monuments of work which he has left are records the value of which cannot be estimated by the many, possibly by none; and the debt which others owe him for stimulus and suggestion can never be summed up."

Appendix

The Course of Lectures on the History of Medicine, Medical Legislation and Medical Education given by Dr. Billings at the Johns Hopkins University in the Autumn of 1877.

Through the great kindness of Mr. H. M. Lydenberg, Director of the New York Public Library, we have had the opportunity of studying the notes left by Dr. Billings. From these notes and from

[15] *Century of American Medicine*, pp. 312-313.
[16] *Johns Hopkins Hospital Bulletin*, 1914, vol. 25, pp. 244-253.

other sources it has been possible to reconstruct not only the course given in 1877 but his subsequent lectures at Johns Hopkins. The notes were in eleven envelopes with a fairly definite arrangement. Some of the notes are typewritten, but a large proportion are in manuscript, evidently written by an amanuensis, as there are some additions in Billings' own hand. From internal evidence it seems quite certain that this series of notes was for the 1877 lecture. While there are some gaps there are references to earlier or later lectures that aid us in supplying the missing titles. The typewritten and other notes were interpolated in the later series of lectures, since they contain references after 1877. While one cannot be certain of the exact order of the lectures or of the ground covered in a single lecture it is felt that the schedule below represents fairly accurately the scope of the course.

Primitive beliefs of Medicine
    Medicine among modern savage tribes

Influences of primitive ideas on modern thought
    Effect of imagination, Faith cures, etc.

While only a few pages of notes for these lectures were found, it is quite possible the missing notes were used for the course of eight lectures given before the Lowell Institute of Boston in 1887, the first of which was published in the Boston Medical and Surgical Journal, January 5, 1888, vol. 118, pages 29-31 and 57-60, and which covers the very same ground as these two lectures.

Egyptian Medicine

Biblical and Talmudic Medicine

Indian Medicine
    The Vedas, Susruta and Charaka

Greek Medicine
    Aesculapius, Homeric Medicine, Aesculapia
    Philosophy. Pythagoras, etc.

Hippocrates

[Dogmatism], Empiricism and Methodism

Roman Medicine
    Marcellus, Pliny, Celsus, Galen

Arabic Medicine

Medicine in the Early Middle Ages

Hospitals and Medical Schools
    [possibly given later]

The Black Death

The Fifteenth Century
    Incunabula
    Syphilis

Paracelsus
    Van Helmont, Valentinus, Sylvius
    Persistence of such views, Mesmerism, Homeopathy

Observers and Investigators
    [Vesalius, etc.], Lancisi
    Harvey and the Discovery of the Circulation
        Servetus, Columbus, Cesalpinus
        Harvey's work
        Aselli, etc.

Sydenham

Haller

John Hunter

Bichat

Modern Psysiology
    Bell, Magendie, Marshall Hall

Medicine in America
    Largely on medical education

Medical Legislation and Medical Education
    In early times
    Education in Hippocratic and Roman times

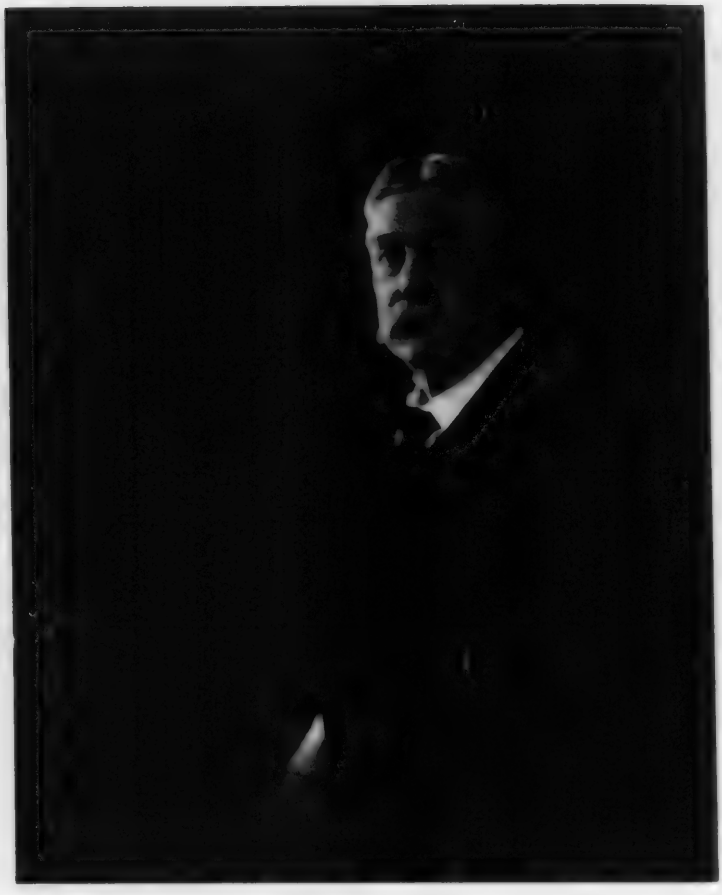
[Possibly the lecture on Medieval Medical Schools (above) was given here.]

Medical Education in Europe

as published as a review, "Higher Medical Education," in Am. J. Med. Sci., July, 1878, new series vol. 76, pp. 174-189. Reprinted in this number of the Bulletin of the Institute of the History of Medicine. [From a letter of Dr. Gilman we know this material was in the original course of lectures and would have been published in the essay "Medical Education" but for financial stringency.]

Medical Education. The Future

as in "Medical Education" published in 1878 and reprinted in this issue of the Bulletin of the Institute of the History of Medicine.



JOHN SHAW BILLINGS

Director of The New York Public Library, about 1910

JOHN SHAW BILLINGS AND THE NEW YORK PUBLIC LIBRARY

H. M. LYDENBERG
Director of The New York Public Library

Every now and then after airily settling all the problems of the universe with neatness and dispatch I find myself speculating about various things that come nearer home. Sometimes, for instance, I have wondered what might have been the development of the library situation in New York City if half a century and more ago, back in 1861, a tall, grave, competent, sympathetic young contract surgeon, walking the wards in one of the army hospitals in Georgetown, had not felt particularly drawn toward one of his patients, a young Union officer. John Shaw Billings could not save the boy's life, but did come to know the patient's brother, likewise a medical man, Dr. S. Weir Mitchell of Philadelphia. An intimate friendship developed that lasted through the life of each and had much to do with their future activities.

Let me show you another picture, two lawyers at the dinner table in New York City, some thirty years later, chatting about this thing and that as they waited for the ladies to come down on their way to the opera. From that casual table talk sprang the movements that led to the consolidation of the Astor and Lenox libraries with the Tilden Trust on May 23, 1895.

Now it happened that one of those men was John Lambert Cadwalader whose sister Weir Mitchell had married as his second wife, and that connection undoubtedly had much to do with the suggestion of Billings as Director of the new institution.

When the offer was made in December 1895 he found it no easy thing to decline or accept. Just a year or two before that he had retired from the army after thirty years of long and faithful service, and had settled down in Philadelphia happy with many close and congenial friends, happy with the prospect of attractive research and teaching at the University of Pennsylvania.

However, he decided to accept; and early in 1896 he began to come to New York a day or two a week to put himself in touch

with the staff, the problems, the opportunities of the new task. That summer he spent abroad, partly as one of the delegates from this country to the congress in London that resulted in the establishment of the international catalogue of scientific literature; partly to buy books and execute other commissions for the library.

He returned in September. It was then I got my first sight of that man who played so important a part in so many widely separated activities. He did nothing more than look down at me over his glasses and ask about my summer's work, but I then knew I stood before a presence. I am not certain just what he said, but I do recall after all these years my striking impression of his power to draw out with a minimum of exertion from himself the maximum result from the person facing him, to inspire a feeling of confidence, a recognition of competence, a happiness to work with and for him.

When he took up the new task he faced a situation full of possibilities and equally full of problems. The Astor Library then had served two generations, its influence spreading far beyond New York, touching almost any scholar or investigator in the country who was working with problems that called for reference to the printed page. Its books constitute a lasting monument to the foresight, imagination, scholarly insistence of Joseph Green Cogswell.

It was Cogswell who first among all the sons of America had the dream—and saw that dream come true—of developing a library for research, for scholarship. College and university libraries in this country go back to the very founding of Harvard over 300 years ago. Subscription libraries date from Franklin's times. The free circulating library idea first took a prominent place when Ticknor and other friends of Cogswell started the Boston Public Library. One more library was, therefore, nothing startling in itself. But Cogswell's distinction and achievement lay in his success in persuading John Jacob Astor, not to found another library, but to establish a research institution, a collection devoted to clearly defined ideals, a library to supplement and to complement other efforts in a way hitherto unfulfilled in this country. Founded in 1849, opened in 1854, it had in 1896 almost half a century to its credit. It enjoyed the fruits and suffered the handicaps of any institution bearing a family name. The Astor family had supported it loyally

for three generations and at length had come to realize that though it had always been a public library public appreciation was more likely to be expressed in complaint than in support.

The Lenox Library then but twenty-five years old was primarily a tribute to James Lenox as a book collector, an outstanding man in that field, a collector moved more by the character and quality of his books than by mere quantity. His interest in the Bible led him to gather one of the great collections of Bibles in English. From that interest it was easy to see how his efforts bore fruit in the field of early printed books, his copy of the Gutenberg Bible being the first to reach these western shores. Shakespeare, Bunyan, Milton likewise came within his ken. He did well in all those fields, but it was American history that marked his greatest success.

He died in 1880, and his successors carried on for fifteen years in the same lines he had followed, with Dr. George Henry Moore in active control for most of that time. New blood in the trustees, however, had come to recognize that new possibilities lay before them, and they seized with eagerness the opportunity of joining with the Astor Library and the Tilden Trust.

The Tilden Trust was an expression of the democratic ideals of Samuel Jones Tilden, who by his will left the bulk of his estate to a trust to be formed for establishment of a free library and reading room and for the promotion of " such scientific and educational objects as my executors and trustees may more particularly designate." There is no need to talk here about the classic struggles over the Tilden will. Suffice it to say that by the middle nineties the trustees had arranged with one of the Tilden heirs for transfer to them of her interest in the estate in case the will was broken.

We are here tonight to talk about Billings and his work with The New York Public Library, and I do not want to seem to speak overly long about prehistoric times. I do feel, however, that a word or two about the early days of the three libraries so recently fused into one may help to understand the setting that faced the new Director in his new task.

Just a moment now as to the less distant past. I have no doubt that some form of consolidation of library activities in New York City would have developed even if John Cadwalader and Lewis

Cass Ledyard had not had their talk that evening after dinner. The very feel of consolidation was in the air. The solution was almost at saturation point. It needed only slight movement to bring precipitation.

I have no doubt either that it was due to the sanity, good judgment, altruism, sense of responsibility of John Cadwalader, Lewis Cass Ledyard, George Lockhart Rives, John Stewart Kennedy that the particular shape and form taken by this movement towards consolidation proved so beneficial to all concerned, to the public as well as to the groups immediately affected. To the public spirit, devotion to the common weal, consistent self-sacrifice of those men too much credit can never be given.

So much for the background, immediate and more distant. When Billings came on the stage he found the income of the new corporation amounted to about $160,000 a year, its stock of books to some 350,000 (about half the number reported then for the Library of Congress or Boston Public Library, a little less than Harvard or the newly formed library of the University of Chicago). In 1895 the Astor and Lenox libraries reported the use of 260,694 volumes by 94,331 readers. The Astor stock represented Cogswell's idea of a scholar's library, faithfully continued by his successors. The Lenox stock, as sketched before, represented the collecting activities of James Lenox, carried on in the same fields by his successors. The books turned over to the Tilden Trust by the Tilden estate amounted to something like 20,000 volumes typical of the collections of a cultured lawyer and public man of those days. The Tilden contribution was largely financial.

Billings found neither library with a satisfactory catalogue judged even by standards current in those days. Both the Astor and Lenox collections were classified according to fixed locations. Neither building had artificial light. Each closed three weeks or a month in summer for cleaning and for vacations. One of the first things Billings did was to provide electric light for each, and thus permit the reading rooms to be open until six in winter. It was a welcome change from the old days when the closing hour depended on the time the dusk arrived or whether the clouds and fogs hung low or high.

He found the Astor books catalogued in two printed records of

four volumes each, noting the holdings as of 1860 and 1880 respectively, with an intermediate supplementary volume dated 1866, all arranged by authors. By 1896 there had grown up half a dozen card catalogues for official and for public use, a decidedly bewildering system of guides for the reader to struggle with until he learned their principles. The Lenox collection had no complete catalogue. In print there were half a dozen short title lists covering various classes of books. Supplementing them was a dictionary catalogue on standard size cards of about 60,000 entries. The whole Tilden contribution had to be catalogued. At the Astor Library there were piled up 25,000 uncatalogued volumes, at Lenox about 100,000 uncatalogued pieces, and in addition there were probably 150,000 titles at Astor that needed recataloguing. Two cataloguers at Astor and one at Lenox cared for current accessions.

It did not take long for the new life and vigor to make itself known. A Bulletin rolled off the press in January 1897, and since that date has come out regularly month by month, now in its forty-second year. The staff was organized into executive, catalogue, shelf, readers, and periodicals departments. Some 350 new periodicals were added, with the current issues put at the command of readers. (Heretofore they had not been ready for use until the completed volumes had been bound, catalogued, and shelved.) A bindery was established, an apprentice class begun, departments formed for the collections of manuscripts, maps, prints, Jewish and Slavonic books. All music, genealogy, local history was concentrated into a single reading room in the Lenox building.

Billings began a new catalogue for public and staff, and simultaneously took up the problem of reclassification. This new catalogue—on standard sized cards—consisted of a single author record for official use, including the collections in both buildings; for the public a separate dictionary catalogue by author and subject for the Astor and Lenox buildings. To this was added a feature new to general library practice, though well known to the users of the Surgeon General's catalogue where Billings had for a generation been making such a brilliant demonstration of his new conception. I refer to the indexing of articles in periodicals and filing into the catalogue the cards for these articles with the cards recording in normal fashion the author and the subject of the printed books.

Not only did the whole collection have to be recatalogued, but it had to be reclassified. Feeling that none of the general classifications then available would meet such special problems as faced him, with the books before him Billings devised a special classification system for this special collection, a system of relative rather than fixed location, catholic enough to include all the books then owned by the Library, elastic enough to provide for indefinite expansion. I like to turn to his "Memorandum on classification in The New York Public Library, 1 January 1899" and recall this characteristic generalization of what he was trying to do. I think you will agree that in its way it is unquestionably a gem.

"Upon this classification it may be remarked that it is not a copy of any classification used elsewhere; that it is not specially original; that it is not logical so far as the succession of different departments in relation to the operations of the human mind is concerned; that it is not recommended for any other library, and that no other librarian would approve of it. As to the system of marking, it is not mnemonic, and its chief recommendation is that it indicates the classes with a comparatively small number of signs. By its means books in the library are divided into about 12,000 groups, with an average of less than forty (40) books in each group, and the average number of letters in the mark for each of these 12,000 groups is three. When more minute classification proves desirable another letter can be added; four-letter groups would give us 250,000 groups."

As I look back at those early days I think it safe to say the only problem of library administration Billings did not take up then and finish was that of the shelf list. Why he deferred action I know not. The shelf list certainly remained an untouched problem until after he died. Without a shelf list the administration of a collection running into the millions of books that now pay so eloquent a tribute to Billings would be impossible.

All of this has to do with domestic and interior problems. A wider one, broader, more obvious if not more important, was the question of the location and plan for the central building steadfastly held in mind from the beginning. There is no need here for a detailed record of the long and difficult steps that led to final accom-

plishment, but it is proper to say that in the development of the plan from early days to final fruition Billings played an important part.

It was on March 25, 1896 that the trustees of the new library delivered to the Mayor an address suggesting that the city erect on the site of the Croton water reservoir on Fifth Avenue between Fortieth and Forty-second Streets a building to house the collections then owned by the New York Public Library and in addition to provide for circulation of books for home use.

As a result of this there came legislation at Albany in May 1897 authorizing the city to erect such a building. Two architectural competitions for the plans for the new structure were held during the summer of 1897, the plans submitted by Messrs. Carrère and Hastings being chosen in November. On December 8th and 9th contracts were executed between the city and the library and the city and the architects. The cornerstone was laid on November 11, 1902, and the building opened for public use on May 23, 1911, a monument to the city that recognized the opportunities for public service offered by such a structure, a monument to the distinct appreciation of the appeal that stone and marble can offer when molded by a competent architect, and a monument of equal eloquence, I feel, to the foresight, the judgment, the skill of Billings who conceived the plan and was happy enough to live to see it brought from the realm of dreams to the workaday world.

It was he who from the first had the idea of erecting this structure around the two inner courts, the idea of putting the main reading room at the rear on top of the main stack room, of providing various special reading rooms for scholars and investigators in special fields, of concentrating the administration at one side of the building, all obvious enough as we see them working out, but none, so far as I recall, developed until then in such striking fashion.

Another service Billings rendered the public comes next to mind in connection with the circulation of books for home use. From the very beginning everyone concerned with the new institution realized that in addition to the help it hoped to give the scholar and investigator lay an equally important, an equally commendable, service to the general public needing books for home use. It was felt, however, that it would be best first to define and mold clearly the ideals to be

followed for the research man, and leave for later consideration the needs of the general public.

At that time there were in New York City a dozen or more independent library organizations providing books for home use, some planned for general interests, some with the needs of particular groups or localities most prominently in mind. All received support to a certain extent from the city, to a lesser extent from the state, and in varying degrees from subscribers, friends, and well wishers.

In June 1900 the comptroller of the city, Mr. Bird S. Coler, asked the trustees of The New York Public Library to study the problem on behalf of the city and to recommend such improvements in relations between the city and these libraries as this study and investigation might indicate. This survey was made that summer by Dr. Billings. In September the trustees recommended to the comptroller the organization of a definite central system with satisfactory supervision and accountability; a request to one of the existing library corporations to undertake the organization of such a system; this corporation to act also as the central authority for the approval of expenditures, for the present to confine its activities to the boroughs of Manhattan and Bronx.

Concurrent with this, partly through independent motives and partly as a result of the study during the summer, came an offer in December 1900 from the New York Free Circulating Library suggesting consolidation with The New York Public Library. This took shape in January following, and then on March 12, 1901 came the letter from Mr. Andrew Carnegie to Dr. Billings offering money to build 65 libraries for New York City estimated to cost $5,200,000, on condition that the city agree to provide the sites, to equip these libraries with books and furniture, and to assure them adequate maintenance in future. The contract between the city and Mr. Carnegie putting this agreement into formal effect was dated July 17th, and the first building erected as a result of this, the Yorkville branch, was opened on December 13, 1902.

And now the record draws to a close, a close to a life of amazing achievement. He came to the library in 1896. The seventeen years following saw dreams realized in a way given only to those who deserve success. He kept up his steady, sturdy, persistent, zealous

THE NEW YORK PUBLIC LIBRARY ABOUT 1932

devotion until the very end. The day's work was well near its end on that afternoon of Monday, March 3, 1913, when he came to my desk, put out his hand, and said with that engaging smile so characteristic of the man, " Well, goodbye, the operation's tomorrow, and I'll be seeing you a day or so later."

The reports at first were encouraging, but pneumonia set in, and he died on the 11th. The funeral services were held on the 14th in the Georgetown church he had walked out of with his bride nearly fifty years before. Burial took place at Arlington.

Others have paid tribute to this man's attainment in various fields; a bewildering, amazing, inspiring record, combining versatility with thorough-going reliability, scholarship with ever present contact with the workaday world. I am glad of this chance to say that in the field of librarianship he holds as high a rank as he did in the fields of medicine, of engineering, of statistics. Those who worked with him came to appreciate his complete command of the situation facing him and them, rejoiced at the opportunity of working with so competent a spirit, undoubtedly were annoyed at times by his inflexibility, but with equal certainty usually came to admit and insist with pleasure and emphasis that he was right. Everyone of us can rejoice that we have had the chance to touch the hem of the garment of such a man, rejoice that he saw such visions, that he was able in so striking a fashion not only to conceive them but to carry them through to triumphant conclusion.